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VOL. 9, No. 1 MARCH, 1943

The Institute in War Time

A POST-PRESIDENTIAL MESSAGE.

By

PROFESSOR J. A. PRESCOTT,
Waite Agricultural Research Institute, South Australia.

The experiences and activities of the Institute during the past three years of war have created a wish among most members to see the Institute play its part, if not in the moulding of national agricultural policies, at least in the sound execution of such policies as may be determined by the circumstances arising from to time out of the war situation. In view of the possible danger of a trend towards dictatorship under such circumstances, it is as well to remind outselves at the outset of the nature of a professional association such as ours. In the words of Mary Follett,* " The word ' profession ' connotes for most people a foundation of *science* and a motive of *service*. That is a profession is said to rest on the basis of a proved body of knowledge and such knowledge is supposed to be used in the service of others rather than merely for one's own purposes." The agricultural scientist performs a function in the agricultural industry. So do the farmers, the machinery and fertiliser manufacturers and their employees, and the seed merchants. Together they form the personnel of the industry, and the professional man will do well to remind himself that his place is neither more nor less important than that of the farmer himself. As B. W. Allin, Head of the Division of State and Local Planning of the Bureau of Agricultural Economics, recently reminded the members of the Soil Science Society of America, most of us are professional " hired men " and he expresses a sound idea in emphasising the cooperative nature of national planning : " cooperative agricultural planning provides for participation by farmers, scientists and administrators." We must remember that in this national planning we should aim to be " public servants ", in the true sense of the term, rather than bureaucrats.

Civilisation is the art of living in communities, and it is characteristic of the most civilised communities that this civilisation has been achieved by a functional division of labour and responsibilities. The function of Agriculture is to provide the food, fats and fibres needed by the whole community. The food industry is not

* *Dynamic Administration.* Edited by H. C. Metcalf and L. Urwick. Bath, 1941

the agricultural industry—it begins where agriculture leaves off at the abattoirs, at the flour mills, at the cold stores, at the central markets. Similarly the fibre industries begin at the ginning factory, the flax mill and the wool shed. I want to emphasise this because I find there has been some confusion of thought regarding the relationship of the Food Council, for example, to the Agricultural Council. A consideration of the function of the Department of Food in Britain will make this a little clearer—this department has to purchase and import food for the community, its turnover runs into a value of hundreds of millions of pounds each year, and it buys both on the home and on the overseas markets. Where it buys and what it buys depends as much on available shipping as on anything else. All that the Minister of Food and the Minister of Shipping ask of the Minister of Agriculture is that as high a proportion as possible is produced at home.

Agricultural Potentialities and Quarantine Projects.

Having thus circumscribed the industry which we serve and our place in it, we may now consider some of the problems which have exercised the minds of our members in the last two or three years and which have found expression in the proceedings of our various branches. The first problem that we selected for study, a potentialities survey of Australia, had its inspiration in an attempt to secure the facts which could be used to refute the vivid imaginings of the super optimist concerning our "illimitable potentialities" or to answer the overseas critics of our "empty spaces". Not all the facts have yet been collected, much research work remains to be done in climatology, in the distribution of soils, in the production of crops and pastures and in the management of pastures before some of the answers can be given to the questions which we are asking. Still in spite of these gaps in our knowledge, there should be no group of professional men in Australia better able than our own to answer the critics or to deal with the super optimist.

The next problem we attempted to solve was that of securing greater efficiency in quarantine measures. If the present measures are not all they should be, our association is obviously the best one to suggest improvements in legislation or administration. In this case we have another function, that of education. By this I mean the education of the public, or Parliament, or Governments or the appropriate Public Services of the need for such a change. It is natural for some of our members to ask what is being done about such reports as we have been able to draft. The information collected in the preparation of the report and the conclusions reached as a result formed the unofficial basis for the decisions reached at an official conference called to deal with the matter. If we can prove that the agricultural industry can be further safeguarded by some modification in our quarantine methods or by the more careful framing of our quarantine laws, then it becomes a matter of educating the community by propaganda or otherwise that such changes as we have to suggest are highly desirable. The recent outbreaks of swine fever both in Western Australia and New South Wales should furnish added proof of the importance of quarantine measures, even under the stress of war.

Agricultural Economics.

The need for greater attention to agricultural economics next claimed our attention. It is difficult to understand why, after so many years of experience in Britain and the United States of the value of economics to the agricultural industry, Australia should have only recently found it necessary or desirable to employ economists specifically for this purpose, particularly in view of the high academic and professional status of many of our Australian economists. No doubt the broader aspects are not being overlooked; economists take part in the administration of the Department of Commerce and of the Commonwealth Bank, and for the past eight

years an economic section has been attached to the Rural Bank of New South Wales. None of the other State rural credit banks, however, appears to employ economists professionally. The important stock and station companies rely on the shrewd business ability and experience of their managerial staffs rather than on the services of professionally trained men, although at least one of these companies is now employing agricultural scientists. These companies have a considerable knowledge of the economic condition of the pastoral industry, and have, over the course of many years of experience, developed working principles in dealing with their problems of credit, land values and the purchase and sale of wool and livestock. It was to the head of one of these firms, Sir Walter Young, of Elder, Smith & Co., that the South Australian Government successfully went for its economic advice in the days of the financial depression.

Agricultural economists in Britain find a place in two main services: one is the day-to-day advisory service to the farming community—a service which does not despise helping out the individual farmer with his financial worries, the other is the administrative service of the Ministries and State departments. The first group of economists is usually the one that gets the best opportunities for research, for it is from advisory work that research gets its inspiration.

In Australia our first aim should be to persuade the economist that there are agricultural problems well worthy of his attention and that the farming and pastoral industries should be well served with agricultural economists. Our second aim should be to see that more agricultural scientists are employed in business and governmental organisations whose interests are mainly financial and administrative. It should be our further aim to see that those of us who elect to take up such work are adequately qualified to meet the pure economist on his own ground.

Something has been made of the lack of facilities for training in agricultural economics and the Australian National Research Council arranged a conference of the universities in order to work out a scheme of centralised training that would meet the needs of graduates in both agriculture and economics. Two universities opposed the idea of an all-Australian centre for post-graduate training on the grounds, first, that a moderate amount of agricultural economics should form an integral part of every agricultural course. If this were achieved, there was no reason why studies in rural economics should not be undertaken in each university by cooperation between the Departments of Economics and Agriculture. The second reason for rejecting the proposal was that the sum mentioned as the maximum appropriation was deemed to be totally inadequate for the work suggested.

The majority proposals of this conference are still before the University Vice-Chancellors and the Institute will do well to continue to advocate that more men trained in agricultural economics should be found work to do by our employing authorities. The Department of Agriculture of New South Wales has already established a Division of Agricultural Economics with five professional economists on its staff.

At the moment the best training that can be recommended to a young man wishing to take up the subject as a career is the time-consuming one of combining the diploma of one of the better agricultural colleges or the degree in agricultural science with the degree in economics, followed by a year or so of research in agricultural economics. There are sound psychological reasons for getting a man started in research soon after he reaches the age of twenty-one, and I must admit that I personally dislike these long drawn-out accumulative courses.

An alternative which is open to many of us is to take up the university courses in Public Administration or in Commerce. Something more might also be done in the direction of giving a more economic bias to our university courses in Agricultural Science.

The agricultural economist will come into his own when the agricultural industry is convinced that he has as much to give to the industry as the plant breeder, the soil chemist or the entomologist.

War Work and Extension Problems.

More recently the subject that has aroused most interest in our branches has been that of the organisation of the Australian agricultural industry to meet the changing circumstances imposed by the war. In 1940 the only State branches convinced that more could be done than was being done were those of Queensland and of the Capital Territory, but by the end of 1942 the Victorian branch was the only one left that was reasonably satisfied that the system of co-ordination of State and Federal Departments through the Australian Agricultural Council was flexible enough to meet the fluid nature of the war-time demands on agriculture. The Agricultural Council cannot determine national needs—determinations are enforced by external conditions, chief amongst which are the shipping situation at any time and the size of the fighting services based in Australia. The Council simply formulates these needs from information supplied by the Departments of Commerce and Supply. The Queensland branch was, however, deeply concerned with securing the more effective use of its members by transferring them from work on one aspect of the industry to another aspect of greater temporary importance. One must remember, however, that such transfers may be hastily conceived and difficult to achieve when it is a case of transferring men from research to advisory or executive services and *vice versa*.

In the early stages of the war the Agricultural Education Association in Britain expressed concern over the wholesale transfer of district officers from extension to executive activities. All the State services, the Council for Scientific and Industrial Research and the universities have now had experience of this type of transfer and it has been found wise to maintain a high degree of flexibility to meet the changing needs of the war situation and the potential needs of reconstruction.

The efficient use of the training and experience of our members in the fighting, munitions and supply services was first safeguarded by a complete reservation, and it was many months before emergency appointments suited to the capacity of each individual could be found. The new man-power committees whould be of considerable help in this regard, but I suppose there will always be some argument whether their function will be to find " jobs for men " or " men for jobs " as it was recently expressed in correspondence in *Nature*.

One matter of interest to the Institute which has been raised recently is an expression of dissatisfaction or rather a questioning of the efficiency of the links between the research and extension services and between these and the industry. This was brought forward notably by Mr. E. Breakwell in his presidential address to the New South Wales branch on 9th February, 1940, and in the address of Dr. A. R. Callaghan to the Animal Health Club in Adelaide on 10th May, 1940. The establishment of the Irrigation Research Extension Committee for the Murrumbidgee Irrigation Areas and of the joint committee of the Institute with the Veterinary Association in New South Wales to deal with extension work in animal husbandry afford other examples of a developing interest in this problem. The link between the research, advisory and administrative services can well be strengthened through special schools, such as those held in recent years in Soil Science at the Waite Institute, in Irrigation Research at Griffith, and in Blow Fly Control in New South Wales, but the real need appears to be for machinery to ensure a more rapid practical application of the findings of research by the farming community.

The democratic way is by education and organisation in which the farmers play a prominent part themselves. This idea lies behind the foundation of the

agricultural bureau system in those States which have adopted it. The higher the standard of education among the farmers, the better the class of extension officer that will be needed in the country areas. In the more advanced farming communities the district agricultural officer becomes an organiser rather than an adviser or instructor and this is very much in evidence today with the formation of war agricultural committees throughout Australia where the chairmen and executive officers of the committees are the professional agriculturists of the State Departments.

Commonwealth Agricultural Organisation.

The effect of the changing war situation on the demand for Australian agricultural products has been of such a character that continuity of policy has been difficult to achieve, and this has led to an increasing control of production and distribution by the Federal Government. This control has grown in quite a haphazard way. In peace time the Department of Commerce and the Council for Scientific and Industrial Research were the main Federal bodies concerned. The Department of Commerce concerned itself with the marketing of the products available for export overseas, it established standards for quality, maintained an inspectoral service to ensure this and controlled the activities of the marketing boards where differences in prices on the home and overseas markets made controlled marketing necessary. The C.S.I.R. found its greatest opportunity of serving the agricultural industry in the study of the problems of the pastoral industry and the irrigation areas.

The main effect of the war has been to restrict the possibility of exports rather through shipping than through restricting real markets. The possibility of exporting wheat in quantity immediately ceased, watery products such as apples, oranges and wine were too wasteful of shipping space ; later the provision of refrigerated space became equally wasteful and the drying of eggs and meat became necessary. The need of the armies also had its effect on local demands, particularly for vegetables, dry pulse crops and dried fruits and for sources of vitamin concentrates. Few would have predicted that a shortage of potatoes would have been possible in such a country as Australia. Sugar has been rationed partly to economise interstate shipping and partly to make more available for overseas export. The nature of the need for flax production changed as soon as Russia came into the war, for Russia is by far the greatest flax producing country in the world.

Few farmers, I find, know and understand the reasons for the violent changes in national policy that have been characteristic of the past few months, and while it may give Federal Departments a sense of power to be able to make quick and reversible decisions regarding the production and acquisition of agricultural products I believe the farming community is entitled to a little more consideration and that many actions, which have been resented by the farmers, would have been readily accepted, if the circumstances involved had been more fully explained to them.

The war has brought agriculture under a great many additional Federal Departments. To the Department of Commerce have been added those of Supply, War Organisation of Industry, Labour and National Service and others. The need for the organisation of the farmers came first through the problems of man-power, for, by taking men away from the farms, this is invariably the way in which all wars have affected agriculture in the past.

The most active interest in the reorganisation of Australian agriculture to meet war-time needs has come from New South Wales. The members of this branch felt so deeply on the need for a proper organisation of agriculture on a Federal basis that they brought their ideas independently of the other branches to the notice of Federal Ministers. Certainly, whatever machinery may eventually be adopted to organise Australian agriculture to meet the changing conditions imposed by war, the immediate

situation is that there are at present far too many Federal Departments concerned and some unifying ministerial control will be required as has already been found necessary in the case of shipping. A Federal Department of Agriculture cannot be satisfactorily created as a war-time emergency measure ; even in peace time it would probably need a Royal Commission to formulate the needs and a convention of State Departments to discuss ways and means. Those of us, for example, who are in the agricultural and pastoral services of the Council for Scientific and Industrial Research would not altogether appreciate the separation from the other Divisions of Forest Products, Fisheries, Industrial Chemistry and Applied Physics, which too logical a reorganisation of State and Federal services, to create a Federal Department of Agriculture, would involve.

The truest form of national planning is collective planning on a national scale. Any central organisation should exist mainly to ensure that the personnel of the whole industry should be effectively organised for war-time production and effectively informed so that its activities are intelligently conducted. The formation of district agricultural committees is a first step, long overdue, in the right direction.

Institute Administration.

The feelings of some of our members that the administrative machinery of our association has proved inadequate to carry out the collective wishes of the Institute in these changing times may have some foundation, and may justify the criticisms that have been levelled at the Proxy Council. Such Proxy Councils are designed, however, for the performance of routine business, such as the election of members and the management of central funds. Matters of policy must, in the long run, be determined either by meetings of Council in person, which in Australia are very expensive, or by general meetings held at a time when many of us are able to travel to a common centre as at the time and place of the Science Congress. Even meetings of Council in person need a great deal of preparation with months of work on the part of State committees. They have been found necessary by the Australian Chemical Institute, which does not conduct any formal business at the time of the Science Congress. An increase in membership fees was found necessary to make these meetings possible.

Our own Council has still plenty of authority, and will function reasonably well, if relatively slowly, when dealing with matters of policy, providing there is free interchange of ideas between the State branches. The Council already has the advice of an editorial committee, a qualifications committee and local man-power committees. These local man-power committees have the additional function of assisting the Deputy Directors of Man-power in dealing with the transfer to special services of individual students and professional men in agricultural science. From this experience the Director-General can be assisted in formulating his more general policies regarding the place in the scheme of national service of our members.

Clausewitz once said : " One who is engaged in war must bring nothing from his books but the education of his mind." The mental training that most of us have had should fit us for more than a narrow specialised field in times of emergency and already many of our members are making use of their training in fields of service which are no longer agricultural. Our main objective must be to see that this mental training is used in the most effective way, in the service of the nation, and eventually we must hope once more, in the service of humanity and of the industry, which it is our privilege to serve.

(Received for publication, 5th February, 1943.)

Sir Daniel Hall, K.C.B., F.R.S.

By the death of Sir Daniel Hall at the age of 78 the United Kingdom has lost its most prominent figure in the combined spheres of agricultural education, research and administration. He held such a variety of important positions and was a man of such varied gifts that it is difficult to form a true estimate of his greatness or of the cumulative influence of his personality and his publications.

Thousands of agricultural students have been grateful to him as the author of such standard text-books as *The Soil, Fertilizers and Manures* and *The Feeding of Stock and Crops*. To others he was best known as the Director of the world-renowned Rothamsted Experiment Station. Others appreciated most his valuable administrative work on the Development Commission and the Ministry of Agriculture, while to many his greatest contribution may appear to have been in connection with the general agricultural policy of Britain during and after two world wars. Still another group of his friends and admirers knew him as an eminent horticulturist and the breeder and exhibitor of some of the finest tulips which ever delighted the eye of man, while those who contacted him only in recent years knew him best as the successor to Sir William Bateson in the direction of the John Innes Horticultural Institution.

Alfred Daniel Hall was born at Rochdale in 1864 and educated at the Manchester Grammar School, where he showed a particularly keen interest in all the scientific subjects. He gained a scholarship which took him to Balliol College, Oxford, in 1881. There he continued his scientific studies with marked success and at the same time revelled in the real Oxford life, taking a prominent part in athletics and rowing, as well as in the general intellectual activities of his College and University. Soon after graduation, he was appointed science master at a school in Birmingham and up to this stage, except for a keen interest in all branches of science and in gardening, he showed little indication of the direction his future career was to take. He soon gave up school teaching and became a University Extension lecturer in the counties of Kent and Surrey. His new duties brought him in close contact with the agricultural community and its problems and he saw the great need for the extension of agricultural education and research which now became his main interest.

When in 1894, as the result of a private benefaction, an Agricultural College was established at Wye in Kent, Hall was chosen as its first Principal at the age of 30, and he soon gathered round him a group of able men including Percival and Theobald and Russell, with the result that Wye soon gained a reputation for both education and research surpassing that of longer established institutions.

After the death of Lawes and Gilbert Rothamsted Experiment Station continued to carry out the routine work which they had instituted with the aid of a skeleton staff, provision for which had been made in the will of the former, but for some time it was without a permanent head. This defect was remedied in 1902, when Hall was chosen as Director—a most fortunate circumstance for both the man and the institution. A few years under his vigorous leadership brought the name of Rothamsted again prominently before the British agricultural community. With his keen analytical mind he first of all reviewed the historic field and laboratory experiments of his predecessors, and from these drew several new and interesting deductions which had been missed by them. He also recognised in the accumulated data and samples a mine of material for further research ; but with only one trained chemist, whose time was practically all taken up with routine analyses and a rather out-of-date laboratory, not much progress could be made. It was a hard fight at first to get additional funds but Hall gradually secured an increase in the laboratory accommodation, equipment and personnel and soon attracted round him a number of voluntary research workers from various parts of the Empire, all of whom owe a

permanent debt of gratitude to him for his inspiring leadership. Private benefactions began to roll in and one might have thought that Hall would have been satisfied with the Directorship of Rothamsted as his life work. After ten years of successful labour, however, he was induced to take over the administration of the Development Fund which had been inaugurated by the British Government for the development of agriculture and the improvement of rural conditions. Hall was chiefly interested in that substantial part of the fund which was allocated to agricultural education and research and there can be no doubt that by his efforts the research and advisory services of the whole country were placed on a much sounder foundation.

It was while holding this position that Hall paid his only visit to Australia to attend the meetings of the British Association for the Advancement of Science in 1914. Many will remember his double-barrelled address as President of Section M and the masterly manner in which he summed up the various discussions. His visit, unfortunately, was somewhat marred and considerably curtailed by the fact that war had broken out with Germany and that his elder son had been amongst the first to volunteer.

In 1917, when the food position in England took on a serious aspect, he was called to his next post as Permanent Secretary to the Board of Agriculture. He entered on his new duties with his usual vigour and enthusiasm, but it is doubtful whether he was so happy in an official position with its inevitable accompaniments of "red tape" and delayed decisions as in a research atmosphere. He did splendid work, however, and stuck to his post manfully till 1926, when, after the death of Sir William Bateson, he was offered the Directorship of the John Innes Horticultural Institution, which is largely devoted to genetical research. Here he was much happier and again he brought fresh inspiration to all his colleagues and with one of them (W. B. Crane) he produced a model monograph on *The Apple.*

He did not retire from this position till 1939 and even then did not give up work, for he took a very real and personal interest in the Lord Wandsworth Agricultural School at Wantage, of whose Board of Governors he was chairman, and right up to the end he was interested in the means of increasing the home food supply in a second world war. As recently as 1941 he published his much discussed book, *Reconstruction and the Land,* in which he boldly advocates the nationalisation of the agricultural land and regrouping the individual farms into holdings of the ideal economic size for the particular kind of farming practised. Other publications which came from his fluent pen include *The Book of the Rothamsted Experiments, A Pilgrimage of British Farming, Agriculture after the War, Digressions of a Man of Science, Our Daily Bread* and *The Book of the Tulip.*

He was knighted in 1918 and many other honours came to him. Besides election as a Fellow of the Royal Society he received honorary degrees from the Universities of Oxford, Cambridge and Aberdeen and he was one of the few recipients of the Victorian Medal for Horticulture (V.M.H.).

Amongst his many fine qualities were an intense love of nature, a genius for friendship and the capacity to inspire enthusiasm amongst his younger colleagues and associates, exceptional clarity of thought and expression and capacity to get right down to the basic facts of any problem. In spite of his busy life he found time for the study and appreciation of several branches of art and literature and also for a good deal of fishing and a little golf.

Sir John Russell's tribute to him is thoroughly well deserved when he says: "Few men have lived a fuller life or one more helpful to the community. His influence will last long after our time and the beneficial activities he started will go on bearing fruit, while his memory will be an abiding inspiration to all who have worked with him."

R.D.W.

The Organisation of Rural Man Power in Australia

By

H. J. Hynes, D.Sc.Agr.,*

Assistant Director of Primary Industries in the Office of the Director-General of Man Power.

Establishment of the Directorate of Man Power.

Up to the time of the establishment in February, 1942, of the Commonwealth Directorate of Man Power in the Department of Labour and National Service, there was no co-ordinated plan of control over man power and woman power in Australia. The Commonwealth departments, the Services, and Industry—both essential and non-essential—all dipped into the man-power pool and requirements of labour were met in anything but systematic fashion. It was, in reality, an all-in and all-out competition for the limited man power that was available. Thus it was over two years after the outbreak of war before there was any serious attempt made to regiment man power, and the enormous task that confronted the Directorate on its formation resolved itself into the optimum war-time allocation of 5,000,000 men and women, 18-60 years of age, so that Australia might play its full rôle in the war effort.

Prior to the formation of the Man Power Directorate, numerous questions relating to supplies of labour were dealt with by the Man Power Priorities Board, but this was purely an advisory body. There was also a list of Reserved Occupations and a military man power officer was attached to each Area Office, but with the formation of the Directorate active steps were taken to set up in each State an organisation which, by reason of its decentralised nature, offered reasonable guarantee that regulations and decisions issued from Headquarters would promptly be implemented. Thus, in each State there was appointed a Deputy Director-General of Man Power, and attached to each of these were a number of National Service Officers stationed at centres throughout the State. Arrangements were made early for the appointment of four advisers to the Director-General† dealing respectively with industrial matters, rural matters, scientific and technical personnel, and women's organisations. Representation of the Directorate was arranged on Commonwealth councils and committees to ensure authoritative opinion on man-power problems being available to those concerned.

The compilation of the National Civilian Register was one of the first undertakings initiated by the Man Power Directorate, and this was followed by the preparation of a revised List of Reserved Occupations. By a process of rationalisation vast numbers of men were made available for the Services from such institutions as trading banks, insurance companies, newspaper offices and so forth.

Following an announcement on 27th May, 1942, by the Prime Minister that 318,000 additional men and women were required by the Armed Forces, Munitions and Allied Works Council, for work up to December, 1942, necessary steps were taken for all labour to be engaged through National Service Officers. This meant that

* Presidential address to the New South Wales Branch of the Institute on 12th February, 1943.

† Mr. Wallace C. Wurth, C.M.G., LL.B., Chairman of the New South Wales Public Service Board, was appointed Director-General of Man Power on 16th February, 1942, and is now also Chairman of the Commonwealth War Commitments Committee.

both employers and employees could only arrange employment in this way—that no employee could transfer from one job to another without permission of his National Service Officer. Those engaged in rural work and various other types of activity, however, were exempt from this regulation. By 16th October, it was apparent that 183,000 men and women would be needed to replace an equivalent number of men withdrawn from essential activities. This resulted in a very active comb-over in protected undertakings with a view to supplying the urgently required men and women.

In January, 1943, it was pointed out by the Prime Minister that the requirements for war purposes known to exist for the period January-June, 1943, were 210,000 men and women. This included the requirements of private contractors in regard to aircraft and munitions production, but did not take into account the additional requirements of the Allied Works Council.

The magnitude of the man-power situation as seen in January may be gauged from the fact that in the October-December period, 1942, the monthly rate of supply was 10,000 persons, provided approximately in equal proportions of men and women, whereas for the January-June period, 1943, the required monthly rate was fixed at 35,000. The Departmental Man Power Committee, after close consideration of the problem, concluded that it was unlikely that more than 10,000 labour units a month could be provided during the first half of 1943. Powers of direction of labour, if approved, appeared to offer a partial solution at least ; these powers were gazetted under the National Security Act on 29th January, 1943.

Loss of Rural Man Power.

During the first few years of the war there was a very marked response on the part of country men to the call for volunteers for active service. At the same time a number of rural workers drifted to munitions factories, where wages were more attractive than in the country. Again, for the greater part of the time during which this depletion of man power was taking place, Australia was in the throes of a severe drought, and this caused many to abandon farming. Added to the problems of drought was the fact that mechanical plant on farms was being commandeered to meet the urgent need for road construction and other defence works, and this, together with the shortage of fuel and fertiliser and the difficulty of securing spare parts, further contributed to the drift which took place from rural industries.

It soon became evident that active steps would have to be taken to conserve the existing rural labour force. Prior to the war (1938-1939) there were approximately 416,000 permanent rural workers in Australia (excluding Tasmania). By July, 1942, there were only 284,000 permanent rural workers, which represented a loss of 32 per cent. It was further computed that the loss of permanent hired labour was 46 per cent. of the number for the pre-war period. These changes were accompanied by changes in the number of women engaged in rural occupations, such that by July, 1942, there was an 11 per cent. increase over the pre-war period for the number of women engaged in dairying and 21 per cent. increase for other rural industries. In the case of juveniles, the percentage increase was 40 for rural industries other than dairying.

The depletion of male workers from rural industries in Canada as at March, 1942, was 18·2 per cent., which is in marked contrast to the depletion of permanent male workers in rural industry in Australia at July, 1942, viz. 36 per cent.

The following table,* which sets out figures for the various States of Australia, is of interest :

* Supplied by the Department of War Organisation of Industry.

State.	Number of rural workers, 1938-39.	Number lost.	Number remaining July, 1942.	Percentage permanent labour remaining.	Percentage permanent hired labour remaining.
N.S.W. ..	130,570	41,130	89,440	68·5	57
Victoria ..	104,971	36,320	68,651	65·4	50
Queensland ..	102,088	26,441	75,647	74·1	62
S.A.	44,421	15,459	28,962	65·2	48
W.A.	33,914	13,023	20,891	61·6	40
Totals ..	415,964	132,373	283,591	68·2	54

The reduction in the rural labour force, however, has not resulted as yet in any perceptible change in the pattern of agriculture, but there has been neglect, inevitable though it was, of such operations as pasture improvement, pest control and maintenance of buildings and fences. Nevertheless there is developing a trend to alternate forms of production and discontinuance of side lines. For example, on mixed sheep and wheat farms there is a tendency to cultivate smaller areas and devote more attention to lamb raising and beef cattle. A noticeable reduction in wheat acreage next season is to be expected, not only on account of man power shortage but by reason of superphosphate shortage, high harvest wages for labour, often inexperienced, and the price of 4s. per bushel which applies only to the first 3,000 bushels of the harvest. In the case of dairying also there are indications that changes to other types of production (e.g. fattening) are taking place, and here again factors such as the need for permits for wire, fertiliser, etc., and the difficulty of securing adequate fuel and spare machinery parts have been almost as aggravating to farmers as inadequate labour supplies.

Steps Taken to Conserve Rural Labour.

1. The first active step taken to conserve existing rural labour was the ruling made by the Director-General of Man Power on 7th May, 1942, in accordance with Government policy, to defer the call-up for military service of all persons engaged full-time in the production of meat, wool, wheat, dairy produce, vegetables (including potatoes), pig-meat, sugar, honey, fruit, tobacco, rice and cotton. Persons engaged predominantly in droving were also deferred from call-up. As from 6th August, all persons who desired to engage labour could only arrange employment through a National Service Officer. Exceptions were made, however, in the case of labour for work on a farm, orchard, vineyard, agricultural or pastoral holdings, etc. This, while enabling free movement of labour within rural industries, permitted control over movement of labour from rural employment into industrial activities. Arrangements were also made that urban and city unemployed, who normally had been engaged in rural pursuits, should be returned to rural employment when seeking work in secondary industries. Cabinet had agreed that only man power necessary for essential rural production should be retained and that surplus men should be diverted to other properties where additional labour was required.

2. Another important development was the establishment of the Seasonal Workers' Register for Shearers. Deferment from call-up was granted to all men whose names were on the register, provided they agreed to work as directed in the off-season. Steps were taken to ensure that all shearers normally employed all the year round, or for a substantial part of it, in rural pursuits should be prevented from finding employment in extra-rural pursuits and were persuaded to assist in harvest operations.

It was arranged that skilled labour, i.e. shearers, pressers, cooks, classers, etc., not usually working the year round in rural production, should be permitted to be

placed in essential occupations—either those normally followed by them in the off-season (abattoirs, wool stores, fellmongering) or in other essential employment. Where this could not be arranged, the men were to be made available to the Allied Works Council on the condition that they would be released at the commencement of the next shearing season. In the case of unskilled men, such as wool rollers, piece pickers, etc., whose only connection with primary industries was during the shearing season, were to be made available to the Army if of military age, otherwise to the Allied Works Council, from which they could be withdrawn next season, if necessary, for shearing operations.

Also, experienced men employed in protected undertakings were permitted to leave their employment, where possible, to engage in shearing last season.

3. On account of the war, the shearing industry last year was faced with the problem of having as many sheep to shear as in previous years, but with only 60 to 70 per cent. of the usual labour available. There were two solutions of the problem : (1) longer hours ; (2) a longer season.

On account of the strenuous nature of shearing work, it was felt that the only way to meet the position was to arrange for a longer season. In any case, without control, the season would have been automatically extended as a result of graziers being unable to obtain sufficient labour to shear their sheep. Early sheds would most likely have been able to secure labour but as the season developed a wild scramble for men would have occurred and sheds in the far west, where a fair amount of travelling is involved, would have been fortunate to secure a team at all.

Starting shearing at the normal time had the disadvantage that late sheds would not get their sheep shorn until January and would thus be faced with having to shear overgrown wool and with fly trouble in addition to other difficulties created by shortage of labour. A late season was also unsatisfactory as when the season is finished a large percentage of shearing labour is used for harvesting, wheat lumping, fruit picking and other occupations that cannot be postponed.

After consultation with the Australian Workers' Union and with representatives of the Graziers' Association of the different States a zoning scheme was evolved which, in the main, proved satisfactory last year and promises, in the light of adjustments made from the experience gained, to be even more successful during the 1943 season.

Under this scheme, New South Wales, Victoria and Tasmania were zoned and shearing within the respective zones was prohibited except between fixed dates. For instance, in Zone 1, embracing the north-west area of New South Wales, shearing had to be completed by 5th July and could not start again before 3rd October. As sheds completed the work, shearers moved from zone to zone in accordance with the prescribed dates. Providing lambing did not interfere, no great hardship or loss of stock was involved. Owing to the urgency with which the zoning system had to be introduced, the clash of lambing with shearing was inevitable and the Man Power Regulations affecting shearing were deliberately framed to permit a measure of flexibility.

In order to see the season through—125,000,000 sheep were shorn—it was necessary to recommend the temporary release of experienced shearers, etc., from the Army, but these men returned to their units as soon as the work was completed. So far the zoning system is operating only in New South Wales, Victoria and Tasmania but is being extended to South Australia this year.

4. In reference to workers in the sugar industry, arrangements have also been made for the preparation of a seasonal register. Normally about 15,000 men are engaged in sugar work but a short supply of labour last season resulted in a call on the Army for temporary releases, and about 2,000 workers were made available.

At completion of the harvest, these men were returned to Army or Allied Works Council according to a definite plan which was drawn up to ensure the most satisfactory placement of the men concerned. Also, experienced men employed in protected undertakings were permitted to leave their employment, where possible, to go cane cutting last season.

5. With a view to providing a mobile labour reserve capable of disposition at short notice to meet the seasonal demands in certain secondary industries, a register was formed of casual workers who had had experience in one or other of the following : meat slaughtering, jam and fruit canning, vegetable canning, fruit and vegetable dehydration, manufacture and distribution of butter, cheese and other dairy products, egg packing, ice and cold stores, ice cream, wool and skin receival, appraisal, packing and storage. Invitations to workers to place their names on the register were arranged through the managers of the firms concerned, the conditions being that applicants were not permanently engaged in the industry and were not in Military Class 1. Provided that registered persons agreed to work where required by Man Power Authorities, exemption from call-up in Military Service or in the Civil Constructional Corps was granted.

Steps Taken to Augment the Rural Labour Force.

A. On 19th June, 1942, whilst attention was being focused on difficulties in respect of man power in agriculture, the Director-General of Man Power announced his desire for the immediate establishment of local Agricultural Committees by the State Departments of Agriculture. This led to the establishment of District War Agricultural Committees, of which there are 115 throughout Australia. Their principal responsibilities have been to study the man-power requirements and resources of the districts in which they operate, and to ascertain methods of organising labour supplies ; also to advise on the relative claims of different industries to the services of available labour, having regard to national production policy. These committees are under the jurisdiction of the Commonwealth Department of Commerce and Agriculture through the State Departments of Agriculture and, whilst their functions to date have very largely been connected with man-power problems, there are other matters such as fuel supply, machinery spare parts, etc., with which they are actively associated and it is expected that their activities in respect of primary production targets will become more and more a reality as time proceeds.

B. The Australian Women's Land Army, which was established in July, 1942 under the Man Power Directorate, is an important development in the scheme for securing reinforcements for rural work of various types. The present strength of the A.W.L.A. is in the vicinity of 2,000, but the aim is to increase the membership to 6,000. Enrolment in the Women's Land Army is open to British subjects and friendly aliens not already employed on the land, and members are expected to serve for twelve months or longer. There is also provision for an Auxiliary which consists of those who are prepared to do at least one month's continuous service. Wages are paid at award or customary rates, or 30s. plus keep (50s. if no keep), which ever is the greater. Payment whilst in training or whilst awaiting placement, and during holidays and sickness, has also been arranged. The organisation in each State is under the control of the Deputy Director-General of Man Power through his Rural Officer, with a woman Superintendent engaged full-time on organisational work. Provision is made for a Supervising Matron, Matron, Sub-Matron, Assistant Sub-Matron and Welfare Officer in connection with the camp and hostels set up by the organisation. Of the present membership of 2,000, about 1,250 have been registered in New South Wales.

Whilst recruiting for the A.W.L.A. is being vigorously pursued, an effort is being made to ascertain the number of women that could reasonably be expected to

be engaged on private farms for most of the year, so that the Government will not be overloaded with financial responsibility for periods during which no work is available for members. Although National Service Officers and the Rural Section of the Directorate in each State assume important responsibilities in connection with the organisation, the cooperation and advice of the District War Agricultural Committees are sought in various matters affecting placement of members. Also, representation of the D.W.A.C. is arranged on local sub-committees which cater for the interests of A.W.L.A. members.

Members of the Land Army are provided with certain working clothes, although no complete uniform kit is provided as with other Services. Fares are paid by the Commonwealth to places of employment and from it ; also to and from home for holidays. There are provisions for compensation under existing Workers' Compensation Schemes in addition to other liability which the Commonwealth itself assumes under certain conditions.

C. Considerable attention has been given in recent months to more extensive plans for the utilisation of aliens, internees and prisoners of war for rural work. There are thousands of male internees of various nationalities held at permanent camps in New South Wales, Victoria, South Australia and Western Australia, and whilst by international law they cannot be compelled to work except on the administration and maintenance of their camps, large numbers have volunteered for, and been absorbed on, such projects as vegetable production, firewood cutting, maintenance of railroads, roadmaking, erection of huts, conversion of salvage, brick manufacture, etc. Owing to reasons of national security it becomes necessary for internees to be constantly under guard, and this together with the costs involved in transport to work some distance from camp, has militated to some extent against their utilisation in rural work, except near centres of internment. In Western Australia, arrangements have been made for the formation of a rural mobile alien corps, which will be retained in a camp that can be moved from place to place as it becomes necessary to divert the corps from one agricultural job to another.

As with internees, prisoners of war—of which there are considerable numbers in Australia—have been absorbed in rural work to some extent. Prisoners of war, however, may be *required* to undertake any work except jobs of a dangerous or unhealthy character and those associated in any way with the operations of war. It is of interest to note that it is the recognised duty of war prisoners to attempt to escape, and for that reason they must have supervision. The British Government is financially responsible for prisoners of war transferred to or held by the Commonwealth, and by agreement accommodation must be in the nature of hutments. Activities on which they have been employed in this country include vegetable production, animal husbandry, firewood cutting, railroad work, erection of huts, etc. The possibility of utilisation of prisoners of war by placing them in ones or twos with individual farmers is being examined.

D. Although by arrangement between the Man Power Directorate and the Army, releases of soldiers are granted from time to time in order to relieve the sudden pressure created by seasonal demands in rural work, the policy of the Director-General has been to approach the Army in this matter only when all other avenues of securing labour have been exploited. Material assistance has been rendered, nevertheless, by release of soldiers when serious losses of urgently needed food crops would otherwise have occurred. Routine orders provide that only personnel who have completed three months' training may be granted leave, and then only if able to rejoin their units within 24 hours of receipt of notification of recall.

E. In the same way, releases from the Civil Constructional Corps have proved extremely useful in times of seasonal emergency, but what is needed perhaps more than anything else to satisfy sudden peak demands for labour is a reserve of able-

bodied men that is, by arrangement, available at short notice for diversion to specified seasonal work. Possibly this reserve could be provided from soldiers who have completed their training, but who are too young for allocation to battle stations ; this possibility is now being closely investigated.

F. Not least in importance amongst the reserves of labour that have materially contributed in the harvesting of essential food crops are the vast numbers of volunteers who sacrificed holidays and week-ends in order to assist in the national effort. In each State of the Commonwealth there are numerous examples recorded of the part played particularly by school teachers, school boys, university students, A.R.P. workers, civil servants, people from commercial firms and so forth. In the organisation of this volunteer labour, the task of the Man Power Directorate was eased considerably as a result of the active cooperation of District War Agricultural Committees.

Powers of Direction of Labour.

As stated above, powers of direction of labour have now been given to the Director-General of Man Power. Portion of the regulations dealing with this subject reads as follows :

1. The Director-General may direct any person resident in Australia to engage in employment under the direction and control of the employer specified in the direction, or to perform work or services (whether for a specified employer or not) specified in the direction.
2. Any such direction may be restricted to a particular class of employment, work or services or may be in general terms, and may specify the period within which, or the time at which, the person directed shall commence to engage in the employment or to perform the work or services.

Other clauses in the regulations provide that where orders of direction are issued, suitable living accommodation shall first be available in cases where the changed employment necessitates living away from the usual place of abode ; also that reasonable transportation expenses to the place of employ shall be paid by the employer for whom the directed person is to perform work or services.

Whilst under the new regulations it may seem a simple matter to arrange labour supplies by directing men from one rural activity to another as required, it is to be expected that such transfers could only be arranged with difficulty and attendant confusion in cases involving permanent or semi-permanent changes of employ. Admittedly powers of direction might readily be employed with advantage to transfer excess labour from one property to another which was understaffed ; or to direct skilled men such as shearers who have accepted permanent employment in extra-rural work, to return to their seasonal occupations, but to deflect men from one rural industry to another when overstaffing is not a consideration implies non-essentiality or low priority for certain types of primary production. The control of rural production, however, has not yet reached this stage, and whilst rationalisation is the logical end to which we should strive, there is no certainty that in this will be found a solution to present and future man-power problems. It must be remembered also that disturbance of existing rural set-ups with a view to settling immediate difficulties could only be countenanced after very close examination both by Commonwealth and States of the possible implications and repercussions in so far as individual growers and all associated commercially with primary industries are concerned. Account would also have to be taken of how quickly a changed production programme could be switched back to another, should circumstances ultimately make such a reversal necessary. Whatever may be done, at all times it will be essential to ensure that the goodwill and cooperation of producers generally is maintained.

It would appear that numbers of persons formerly engaged on seasonal rural work have now joined the permanent labour force, and that while the supply of

permanent workers has not been inadequate in most cases (though unevenly distributed) the shortages of seasonal labour at peak periods of harvest have become very disturbing at times. It is felt more than ever necessary, therefore, that action further to that already outlined above will need to be taken to build up reserves of man power that can be called upon and directed where and when required in order to meet sudden seasonal demands. It has been suggested that a compulsory scheme involving diversion of all rural workers of military age for 18 days a year from their properties to other places requiring labour could be arranged during slack periods without interfering with normal production. Farmers could even be given the opportunity of stating which period of the year would suit them best, and in what work they had had previous experience. To some extent this idea was put into effect last year in Victoria when wheat growers were temporarily transferred to abattoir works to assist in slaughtering operations, and then allowed to return to their farms in time for the harvest. Transfers of men for temporary seasonal work are much more conveniently arranged than transfers of a permanent or semi-permanent nature which, as already indicated, would involve rationalisation of rural industry (probably by increased mechanisation) together with the development of additional self-help schemes amongst farmers, possible drastic action in connection with inefficient farms and farms in marginal areas, apart from possible considerations of a modified system of collective farming. Whilst cooperative methods in farming are necessary, it is questionable whether reduction in the number of individual properties is desirable, even if only considered from the standpoint of the risks of spread of crop and stock diseases when production is concentrated in aggregated units.

Summarised, direction of rural labour may be viewed more as something applicable to man power for temporary seasonal demands, the sources for direction being the permanent farm workers together with those who normally follow casual work and who are listed or will be listed on seasonal registers for rural industries and the secondary stages of primary industries. Any other sources can only become available if and when the existing agricultural structure is changed—and this becomes a problem more for agricultural administrators than for the Man Power Directorate.

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Warigo—A Disease-Resistant Wheat

By

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Stem rust, flag smut, bunt and take-all have been the most serious diseases of wheat in Australia. At the present time bunt, and to a lesser extent flag smut, cause little concern to the farmer. The former is controlled by dusting with fungicidal dusts and the latter by growing resistant varieties bred in Australia.

In recent years wheat breeders have made great advances in producing varieties resistant to stem rust; three of these—Hofed, Fedweb and Eureka—have been produced in New South Wales. In South Australia stem rust epidemics are sometimes very severe, e.g., it is estimated that in 1941 the disease reduced the return to growers by £1,500,000. Just as it is necessary for all new wheats to possess flag smut resistance, so, it would seem, our future wheats will need to possess stem rust resistance.

The control of take-all is a more difficult problem and one which at present is outside the scope of the plant breeder.

Wheat Breeding at the Waite Institute.

At the Waite Institute a breeding programme was commenced in 1929 having as its object the transference of the disease-resistant qualities of the American wheat Hope to our Australian varieties. Resistance to stem rust and flag smut were to be the first considerations but it was hoped that progenies would be secured possessing the additional resistance of Hope to leaf rust, bunt, loose smut and mildew. In more recent years the stem rust resistant wheats from Kenya Colony and other promising varieties from overseas have been utilised in the breeding programme.

Satisfactory rust epidemics at the Waite Institute during the past ten years have given excellent opportunities for selecting resistant strains and at the present time all the material in the F_5 generation possesses both stem rust and flag smut resistance, and, in addition, much of it is resistant to leaf rust.

The first Hope derivatives to pass the preliminary yield trials were several Gluyas × Hope strains. These stem rust resistant strains yielded well but were weak in the straw, difficult to thresh and susceptible to flag smut. They had to be discarded, although they were subsequently used as rust resistant parents. In discarding this material, attention was directed to very promising F_7 material from a Nabawa × Hope cross made in 1931.

The Selection of Warigo. In 1934 and 1935 rust resistant selections were made from F_3 and F_4 rows of this 1931 Nabawa × Hope cross, the selections being made away from the red grain colour of the Hope parent. From the outstanding F_5 rows a white-grained strain was selected for a plot trial in 1937 and its yield equalled that of the Ranee check plots. In 1938 this selection (37-76) outyielded all other crossbreds and varieties in a non-replicated trial. Baking tests on this 1938 sample conducted by the State Department of Chemistry gave evidence of good baking quality. In 1939 the crossbred yielded well in its first replicated yield trial, its high resistance to flag smut and powdery mildew was demonstrated, and further confirmation was obtained of its stem and leaf rust resistance.

The dry 1940 season at the Waite Institute was remarkable for the complete absence of stem and leaf rust. Yield trials therefore measured the inherent yielding

ability of the strain in the absence of these diseases. The Nabawa × Hope crossbred yielded 92 per cent. of Ranee and 103 per cent. of Nabawa. At country centres when it was tested for the first time the yield was 98 per cent. of Ranee at Lowalde in the Mallee and 104 per cent. of Ranee at Saddleworth in the mid-north. Flag smut resistance was again confirmed and preliminary loose smut and bunt tests indicated that the crossbred was resistant to loose smut and possessed some resistance to bunt. The State Department of Chemistry reported further on the 1940 grain sample that the strain was " a strong flour wheat with exceptional dough stability ".

In 1941 a severe stem rust epidemic occurred in most districts of South Australia—the estimated yield for the State of 40 million bushels was reduced, largely by rust, to 30 million bushels. The Nabawa × Hope crossbred, now in F_{10}, was widely distributed in farmers' test plots, and in all districts where rust was serious the resistance of the crossbred was reflected in its superior yield. In Table 1 the yield and bushel weight of the Nabawa × Hope selection are compared with those of five other varieties included with it in a replicated trial at the Waite Institute.

TABLE 1.

Mean Yield and Bushel Weight of Six Varieties grown at Waite Institute, 1941.

Variety.	Mean Yield. (Bus./acre.)	Bushel Weight. (Lb.)
Nabawa × Hope (Warigo) ..	51·0	64·3
Eureka II	46·2	64·0
Hofed I	40·3	62·8
Hope	34·4	63·5
Nabawa	27·8	53·8
Ranee	21·4	52·5

Standard deviation of difference between two means, 3·03 bushels per acre.

In 1941 all six diseases—stem rust, leaf rust, flag smut, loose smut, powdery mildew and bunt—appeared in epidemic form in the disease nurseries and the Nabawa × Hope selection again proved it had varying degrees of resistance to them.

At the conclusion of the 1941 season Nabawa × Hope (strain 37-76) was released to farmers under the name " Warigo ".

Description of Warigo.

Origin. Selected at the Waite Agricultural Research Institute, Glen Osmond, S.A., by I. F. Phipps and S. R. Hockley from a cross made in 1931 between Nabawa and Hope.

Description. A white-grained, white-chaffed, tip-awned wheat resembling Bencubbin. Mid-season in maturity, heading out a day or two earlier than Nabawa and two to three weeks earlier than the other parent, Hope. The ear is mid-long and slightly tapering, the grain is heavy, of medium size, smooth and usually vitreous under Waite Institute conditions. The straw is mid-tall, fine, standing better than Bencubbin. The grain does not shatter readily.

Baking Quality. Baking and farinograph tests conducted by the State Department of Chemistry in 1938 and 1940 classed Warigo as " a strong flour wheat with exceptional dough stability ".

Disease Resistance. Stem rust (*Puccinia graminis tritici*).—High mature plant resistance to the predominating Australian race 34* (Fig. 1). Susceptible to this race in the seedling stage.

Leaf rust (*Puccinia triticina*).—Highly resistant at maturity to Australian race 16* (Fig. 2).

* The authors are indebted to Dr. W. L. Waterhouse of the University of Sydney for these race identifications.

Figure 1.
Stem rust resistance of Warigo (left), unnamed susceptible crossbred (right).

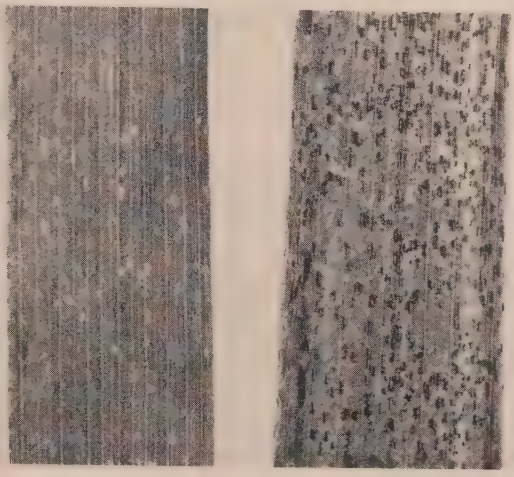

Figure 2.
Leaf rust resistance of Warigo (left), compared with Ranee (right).

Figure 3.
Loose smut resistance of Warigo (left), compared with Ranee (right).

Flag smut (*Urocystis tritici*).—Warigo has proved to be even more resistant than Nabawa. In tests where Federation and Free Gallipoli showed 70–80% infection the Nabawa figure was usually 1–3% and Warigo always less than 1%.

Bunt (*Tilletia tritici* and *T. levis*).—Warigo has apparently inherited from Hope a partial resistance to bunt. Using a collection of very pathogenic strains Hope usually shows 0–5%, Warigo 35–45% and Nabawa 60–70%. A greater degree of resistance than that shown by Warigo will be necessary before dispensing with pickling.

Loose smut (*Ustilago tritici*).—Inoculations made in 1940 with a single collection of loose smut resulted in 100% infection in Ranee and 1% in Warigo (Fig. 3). This result was confirmed in 1942.

Powdery mildew (*Erysiphe graminis tritici*).—Warigo has always been highly resistant in the field to the prevailing races of powdery mildew. Under certain glasshouse conditions some mildew may develop on Warigo, as also on Hope, although Thew and Sonora remain quite free.

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Variations in the Protein Content and Diastatic Activity of Victorian Commercial Wheat

By

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The major objective of the modern flourmiller is the production of flour regular in composition and quality. These factors obviously depend upon the wheat from which the flour is milled, and to a lesser extent, upon the milling itself.

It is widely known that the natural influences of soil, climate and other factors all operate to produce wide variations in the characteristics of the one variety of wheat both within the one State and from season to season.

Commercially these differences are enhanced by the fact that millers except in special circumstances, are unable to buy wheats on the basis of variety but (through the limitations of our present silo system) are able only to buy a very mixed lot of wheat from any particular district. Consequently, as will be shown later, a consideration of the Agriculture Department's analysis of the official F.A.Q. sample of wheat gives little indication of the difficulties and variations which face the commercial cereal chemist and flourmiller. The F.A.Q. represents a fair, average quality sample of the wheat crop as determined each year by the Chamber of Commerce for each State.

Experimental Data.

From 1935-36 to date the author has made detailed analyses, milling and baking tests on experimentally milled flours from samples of wheat from different stations in Victoria. The stations selected are representative of the wheat growing areas in each district, but owing to drought it has not been possible to obtain wheat from all of them in each season. Only samples of sound wheat complying in type to the F.A.Q. sample are considered. The samples recorded are running samples taken during unloading from not less than eight trucks of wheat from the one station. These bulk samples are then quartered according to accepted sampling methods and, therefore, can be taken as truly representative of each station under consideration.

Protein (N. $\times 5{\cdot}7$) is determined by the standard Kjeldahl method[1] and the diastatic activity by the Kent-Jones method.[4]

The average, minimum and maximum values for protein and diastatic activity as found in these surveys together with the analysis of the corresponding official F.A.Q. sample are given in Table 1.

Figure 1 shows a distribution diagram for the protein content and Figure 2 for the diastatic activity of all the samples considered during the five seasons 1936-37 to 1940-41 inclusive.

Seasons 1938-39 and 1940-41 were drought years when the wheat yield per acre was reduced far below average. Whilst an odd drought year is not unexpected, it is unusual to have two within three years.

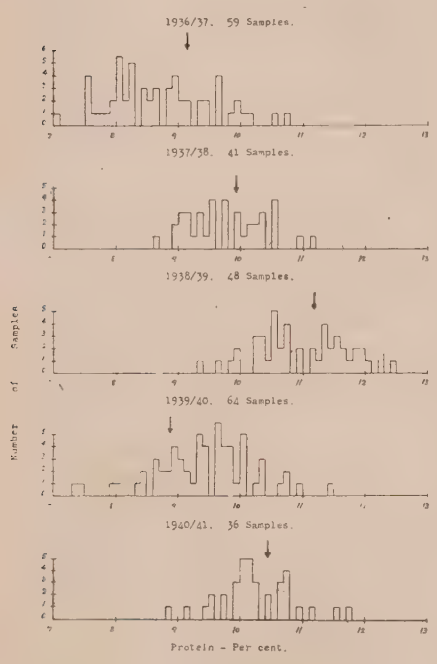

Figure 1.

Protein distribution diagram of Victorian commercial wheat samples, seasons 1936-37 to 1940-41 inclusive. Arrow indicates the protein content of the F.A.Q. sample.

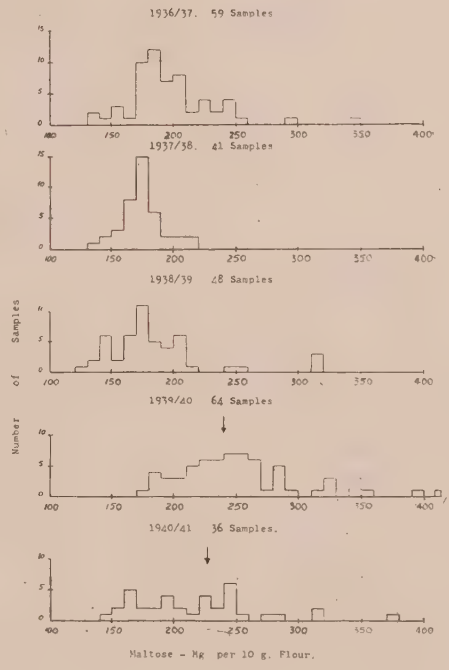

Figure 2.

Diastatic activity distribution diagram of Victorian commercial wheat samples, seasons 1936-37 to 1940-41 inclusive. Arrow indicates diastatic activity of the F.A.Q. samples analysed by the same method as that used for the commercial samples.

Discussion.

The limited value of the F.A.Q. sample is illustrated amply by a consideration of Table 1.

For example, in the 1939-40 season the maximum protein range was from 7·30 to 11·46 per cent. and the range in diastatic activity was from 177 to 411 milligrams of maltose per 10 grams of flour. Comparative figures for the corresponding F.A.Q. sample were 8·78 per cent. and 240 milligrams per 10 grams of flour respectively, the latter figure being determined by the writer in the same manner as that for the truck samples. Thus it will be seen that under the present F.A.Q. system it is neither

possible to give any range at all nor to indicate to the wheat buyer the likely variation from district to district.

The question that next arises is whether or not the F.A.Q. represents a true average of the season's wheat, for it will have been noted from Table 1 that the F.A.Q. protein is well above that for the Mallee and Wimmera (the bulk of the samples examined) in four years and below it in the fifth. In Table 2, the weighted averages of the analyses of the truck samples have been set out together with the F.A.Q. figures, only those results for diastatic activity which were obtained by the same analytical method being included.

TABLE 1.

Protein and Diastatic Activity Values for Experimentally Milled Flours (Moisture Content 15·0%) from Wheats from Various Victorian Districts. Seasons 1936-37 to 1940-41 inclusive, with Corresponding Figures for F.A.Q. Flour Samples.

Season.	District.	No. of Samples*	Protein (N.×5·7) Per cent.			Diastatic Activity.† Mg. Maltose per 10 g. Flour.			Flour from F.A.Q. Sample.‡	
			Average.	Minimum.	Maximum.	Average.	Minimum.	Maximum.	Protein (N.×5·7) Per cent.	Diastatic Activity.§ Mg. Maltose per 10 g. Flour.
1936-37	Mallee ..	30	9·02	7·01	*10·77*	209	*136*	*349*	9·12	142
	Wimmera	15	8·66	7·58	10·59	176	139	248		
	North-East	10	8·25	7·70	8·86	216	180	260		
	Northern..	4	7·45	*6·10*	8·13	187	183	190		
1937-38	Mallee ..	23	9·46	8·90	*11·18*	168	*139*	194	9·92	152
	Wimmera	9	9·09	*8·66*	10·06	182	145	*218*		
	North-East	6	9·85	8·90	10·38	180	170	201		
	Northern..	3	9·99	9·50	10·54	179	175	187		
1938-39	Mallee ..	23	10·79	*9·39*	*12·48*	186	*125*	*313*	11·17	168
	Wimmera	20	11·10	9·65	12·22	174	139	209		
	North-East	5	11·57	11·31	11·83	200	147	243		
	Northern..	—	—	—	—	—	—	—		
1939-40	Mallee ..	40	9·52	7·93	*11·46*	244	*177*	*411*	8·78	155 (240)†
	Wimmera	14	9·57	8·48	10·70	247	187	329		
	North-East	6	8·41	7·49	9·31	249	190	320		
	Northern..	4	8·67	*7·30*	10·03	341	280	394		
1940-41	Mallee ..	13	10·09	*8·85*	*11·74*	199	156	274	10·43	152 (227)†
	Wimmera	17	10·35	9·74	*11·11*	225	167	288		
	North-East	6	10·20	9·53	10·77	236	*145*	*373*		
	Northern..	—	—	—	—	—	—	—		

* Each sample is from not less than eight trucks of wheat from the one station.
† Kent-Jones method.[4]
‡ Jewell.[3]
§ Blish-Sandstedt method.[2]

Table 2 shows for the two seasons 1939-40 and 1940-41, in which it was possible to compare directly the diastatic activity values, that there was substantial agreement between the F.A.Q. and the other samples. In two of the seasons considered there was practically no difference between the protein values, and in the other three seasons the F.A.Q. protein ranged from 0·43 per cent. above, to 0·59 per cent. below the weighted mean for the corresponding samples analysed by the writer. These differences are significant and are due, no doubt, to the differences in sampling methods employed and to the difficulty of sampling accurately a wheat crop of up to 45,000,000 bushels. The writer prefers his method of sampling, though he is aware that the samples for F.A.Q. purposes are probably drawn from a greater number of stations. However, as the wheat silos throughout Victoria increase in number and if running samples are taken during their filling, so should the F.A.Q. sample reflect more and more accurately a true crop average.

TABLE 2.
Weighted Averages of Results Listed in Table 1.

Season.	No. of Samples.	Flours from Wheats from Various Districts. Weighted Average.		Flours from F.A.Q. Samples.	
		Protein Per cent.	Diastatic Activity.*	Protein Per cent.	Diastatic Activity.*
1936-37	59	8·69	200	9·12	—
1937-38	41	9·47	174	9·92	—
1938-39	48	11·00	183	11·17	—
1939-40	64	9·37	246	8·78	240
1940-41	36	10·23	217	10·43	227

* Milligrams of maltose per 10 grams of flour.

Tables 1 and 2 also demonstrate the variations from season to season. For example, the decrease in the protein (weighted average) from season 1938-39 to 1939-40 was from 11·00 to 9·37 per cent., a difference of 1·63 per cent. For the same years there was an increase in the average diastatic activity from 183 to 246 milligrams of maltose per 10 grams of flour, a difference of 63 milligrams per 10 grams of flour.

It is apparent that any miller who lacks facilities for the grading and storing of wheat, but who mills it as it is received, must experience variations in his flour. Even when the most careful control is exercised seasonal differences may be marked.

Conclusions.

From a study extending over a number of years of commercial samples of Victorian wheat it is seen that it is not uncommon to find in any one season a difference of more than 3 per cent. between the minimum and maximum protein contents and a difference of more than 200 milligrams of maltose per 10 grams of flour between the minimum and maximum values of diastatic activity. For example, in the season 1939-40 these values were respectively 7·30 and 11·46 per cent. protein, and 177 and 411 milligrams of maltose per 10 grams of flour.

The mean variation from season to season in the average protein content is 1·20 (minimum 0·78, maximum 1·63) per cent., and in the average diastatic activity is 32 (minimum 9, maximum 63) milligrams of maltose per 10 grams of flour.

The official F.A.Q. sample has no value to the miller other than that of serving as a reference standard with regard to bushel weight and general appearance.

Acknowledgment.

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Inheritance and Use of Vigour in Pear Seedlings

By

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Since the inception of a pear breeding project in New South Wales in 1928, the crossbred seedlings raised at Narara Viticultural Nursery from controlled pollinations have been examined for characteristics of possible horticultural value or of use in breeding. Over a period of years, some noteworthy differences in vigour have been observed, but unlike apple seedlings raised during the same period, which showed striking variations in root type,[2] pear seedlings have shown only slight differences in rooting habit.

With apple seedlings, it is well known that those of triploid parentage possess poor vigour, this also having been observed in the seedlings of the triploid apple varieties Gravenstein and Stayman in New South Wales. A similar reduction of vigour might be expected among the seedlings of triploid pears, but apart from this indication, there is no reference in the literature to the influence of parentage on pear seedling vigour. Of the varieties to be discussed, none has been reported to be triploid, but P. Barry is suspect, because of the low seed content which characterises its fruit, whether open or hand pollinated, in New South Wales ; there are no such grounds for suspecting triploidy in the other varieties used. Beurre Bosc, Doyenne du Comice, Glou Morceau and Williams have been reported to be diploid[6] and the remainder, on external criteria, appear to be diploid.

Method.

The seeds derived from hand pollinations made in cooperation with Mr. R. E. P. Dwyer between 1930 and 1934, and with Mr. W. T. Atkinson during the two subsequent years, the results of which have been reported in part.[1, 3, 4, 5]

The seeds were sown in seed beds at Narara Viticultural Nursery and the seedlings transplanted into nursery rows three feet apart, at the end of their first season's growth. The batches of seedlings of the different crosses were planted at random in a block usually without replication. After one to three years' growth in the nursery rows, the pear seedlings were dug, removed to experiment farms, and grown to the fruiting stage. The present results refer only to the vigour shown in nursery rows at Narara.

In 1936 a more complete combination of varieties was available than in previous years, and in view of the differences of vigour that were apparent the seedlings were weighed individually after being lifted in July, 1939. At that time the seedlings were in the leafless dormant condition after three years' growth from seed. The seedlings were weighed to the nearest quarter-ounce. Weighing was preferred as a measure of vigour, although it was realised that the usual commercial manner of lifting seedlings which was adopted, *i.e.* by sinking a spade obliquely from each side of the nursery row so as to cut the roots at spade depth, would somewhat penalise the weights of the vigorous seedlings. Pear seedlings become extremely deep rooted in the deep sandy soils of Narara Nursery, and more of the root system of vigorous than of less vigorous seedlings remained in the soil by reason of this method of lifting. The number of plants in each cross ranged from a dozen to a hundred, the average being about 50.

Results.

In the field it was observed that some female parents such as Josephine and P. Barry gave generally poor seedlings, whilst others such as Howell, Anjou and Comice gave vigorous seedlings. It was also apparent that the pollen parent had considerable influence in at least some combinations, and the seedlings resulting from selfing were variable in vigour according to the parentage.

The mean weights and standard errors calculated for the seedlings of the 1936 sowings revealed these observations in quantitative terms and, moreover, permitted a closer analysis of the parental influence on vigour than would have been possible from field observations alone. Instead of presenting a table of mean weights and standard errors, the data are given in Figure 1, so that, with the varieties arranged along the ordinates and abscissæ according to the order of average vigour of their seedlings, visual comparisons may be readily made. The side of each square corresponds with the average weight of the seedlings and comparisons should be made between the lengths of the sides, not the areas, of the squares.

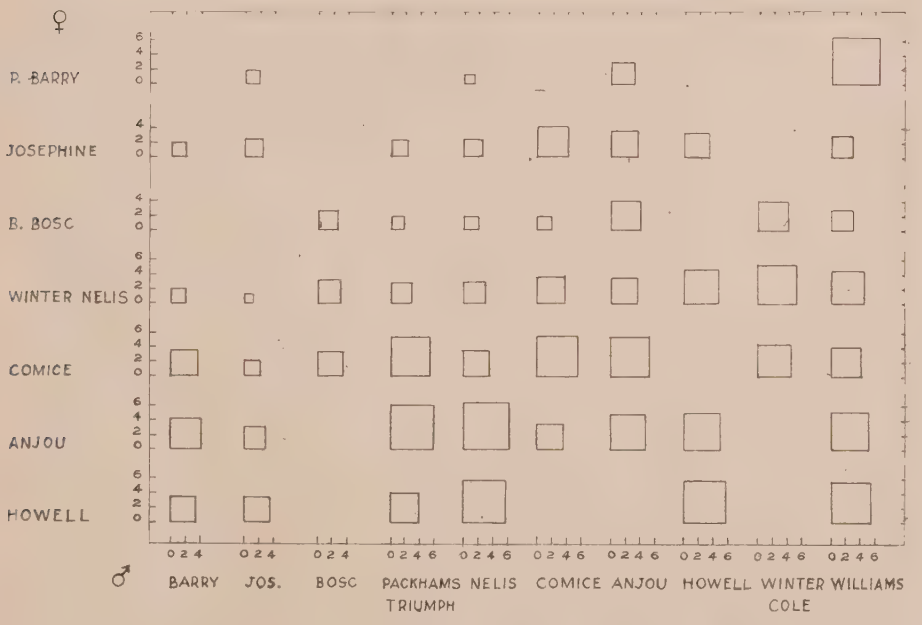

Figure 1.
Vigour as mean weight (ozs.) of cross-bred pair seedlings.

The figure shows particularly the influence of the varietal combination on the vigour of the seedlings. There is a general tendency for the vigour of seedlings of seed parents to improve with the pollen parents in the order shown. This is most marked for Josephine, P. Barry, Beurre Bosc and Winter Nelis, and less so for Comice, Anjou and Howell; Packham's Triumph and Winter Nelis pollens caused greater vigour with these varieties than expected from their effect on other varieties. There is also a similar trend in the seedlings of the pollen parents to improve in vigour with the seed parents in the order shown, notable exceptions to the order being Josephine × Comice and P. Barry × Williams.

There are six lots of selfed seedlings, namely Josephine, Beurre Bosc, Winter Nelis, Comice, Anjou and Howell, having the following mean weights, 2·50, 2·71, 3·07, 5·35, 4·86, 5·90. It will be seen in Figure 1 that these values are of an increasing order which would be expected from the relative vigour of the cross-bred progeny of these varieties. Josephine and P. Barry, which generally gave seedlings of low vigour on cross pollination, gave seedlings of low vigour on self pollination; Comice, Anjou and Howell, which give vigorous seedlings on crossing, gave vigorous seedlings on selfing, and Winter Nelis and Beurre Bosc gave seedlings intermediate in vigour.

TABLE 1.

Comparative Vigour of Cross-bred Pear Seedlings.

Female Parent.	Sown.	Male Parents.										
		Glou Morceau.	P. Barry.	Josephine.	Beurre Bosc.	Packham's Triumph.	Winter Nelis.	Comice.	Anjou.	Howell.	Winter Cole.	Williams.
Glou Morceau ..	1933			a			a				b	b
Josephine ..	1930					a						
	1931											b
	1932						a		a			a
	1935		a	a	a		b	b	b	a		
	1939			a								
Beurre Bosc ..	1933	a			a		a	a			a	a
	1939			a	b		b	c	c			
Packham's Triumph.	1930			a				c	b			b
	1931								c		a	
	1932									b		
	1933											a
	1935			a								
Winter Nelis ..	1930							a				
	1931						c				c	
	1932			a		a			b			b
	1935								c			c
	1939			b				b				
Comice ..	1935			b								c
	1939							c				
Anjou	1931					b			c			
	1935			b						c		
Winter Cole ..	1931										c	c
	1933	a			b	b	a	a				c
	1939			b			c		c			
Williams ..	1931			a							a	
	1932	a				a	c		c	c	c	
	1934				a			b	c	b		

a=poor vigour; b=moderate; and c=good vigour.

Reciprocals. Of the thirteen pairs of reciprocals available for comparison, eight showed no significant difference between the pair. Of the remaining pairs which showed significant disagreement Josephine × Comice and Anjou × Winter Nelis gave values rather high for the suggested order of inherent vigour and Beurre Bosc × Comice, Winter Nelis × Josephine and Anjou × Comice values slightly low.

Differences in vigour among pear seedlings, recorded in previous years, were assembled and gave the results shown in Table 1. These data, representing the records of six years' sowings and 78 lots of seedlings, support the general order of the varieties given in Figure 1, and add information for other varieties. It is clear, however, that such qualitative data could not provide the indications of vigour differences that are shown in Figure 1. Crosses between the varieties of good inherent vigour gave seedlings which were graded mostly as *c* or good, between those of poor inherent vigour gave seedlings which were graded as *a* or poor, whilst crosses between these groups gave seedlings which were graded *a*, *b* or occasionally *c*.

In all, the indications are that pear varieties may be placed in the following approximate increasing order of transmitting vigour to their offspring—P. Barry, Josephine, Glou Morceau, Beurre Bosc, Packham's Triumph, Winter Nelis, Comice, Anjou, Howell, Winter Cole, Williams.

By future work other varieties may be added to the list, in which case the vigour of their selfed seedlings should prove a useful guide to establishing their comparative inherent vigour.

Discussion.

Genetics. Pear varieties, themselves not very dissimilar in vigour, transmit different degrees of vigour to their progeny, the inherent vigour only becoming apparent on breeding. It appears that vigour in the seedlings is a matter of the combination of varieties. Crossing parents with low inherent vigour gives poor seedlings. Crossing parents with high inherent vigour gives vigorous seedlings. Varieties of low vigour when crossed on to parents of high vigour depress the vigour of the seedlings and *vice versa*.

The majority of the reciprocals available did not differ significantly, indicating no undue maternal or paternal influence on the inheritance of vigour.

The results of selfing and crossing pear varieties indicate that the factors responsible for vigour are transmitted as well in self pollination as in cross pollination.

Vigour is a character which is probably governed by the interaction of several favourable growth factors. As pears are polyploid, several of the factors are possibly repeated, and there are more, or more potent, factors in some varieties than in others. The degree of vigour shown is apparently an expression of the combination in the seedlings of these multiple factors from the parents.

Fruit Breeding. The fact that some pear varieties are highly self fertile[1] and that the degree of vigour is maintained on selfing may provide a valuable means of obtaining more homozygous breeding material for future use. If it should prove that vigour is maintained during further generations of selfings, these may be used to accumulate desirable characters in the seedlings without a loss of vigour. As in any breeding programme, the useful commercial characters are of primary importance, the vigour on selfing might be used to accumulate some of these in selfed lines for later combination with other selfed lines with desirable characters or with other varieties.

One of the difficulties of pome fruit breeding is the heterozygous nature of the breeding material. There is extreme variation among the seedlings in, for example, fruit qualities, earliness of bearing, much more so in pears than in apples. The

majority of pears, that have fruited so far, have scarcely edible, bitter, astringent or tiny fruit, whereas the majority of apple seedlings have edible, if mediocre, fruit. Great numbers of seedlings have to be raised to secure an occasional good seedling, which itself is heterozygous like its parents and from this point of view does not improve the future breeding situation. Although the method of utilising lines of selfed pears is far-sighted, it is suggested as a means of eventually getting relatively homozygous material. If this procedure seems too lengthy, it should be recalled that a century ago Van Mons raised many thousands of open pollinated seedlings to secure a handful of commercial varieties, and while a few of these are among our leading varieties today, his work contributed little towards our knowledge of pear breeding.

Pear Rootstocks. The inheritance of vigour among pear seedlings shown in these studies has a broad application to the choice of seed for raising rootstocks and to future rootstock investigations, for despite the possibilities inherent in clonal pear stocks, seedlings remain the principal rootstock for pears. The majority of commercial stocks have been imported until recently from France, but considerable experimental use has been made of open-pollinated seedlings of commercial varieties in New South Wales during the past decade.

To obtain vigorous seedlings from local varieties, attention must be given to the male as well as the female parent. The relative seedling vigour that may be expected from locally grown varieties may be summarised as follows :

(1) Poor vigour resulting from pollinations between Glou Morceau, P. Barry, Josephine and Beurre Bosc. The mean weight of seedlings of this group in Figure 1 was 2·2 ounces.

(2) Medium vigour, resulting from the pollination of the above varieties by Packham's Triumph, Winter Nelis, Beurre d'Anjou, Doyenne du Comice, Winter Cole, Williams, or *vice versa*. The mean weights of the seedlings of these groups in Figure 1 was 3·3 and 3·1 ounces respectively.

(3) Good vigour, resulting from pollinations between Packham's Triumph, Winter Nelis, Beurre d'Anjou, Doyenne du Comice, Winter Cole, Williams. The mean weight of this group was 4·5 ounces.

For large scale nursery purposes, open pollinated seeds would necessarily be used. The vigour of seedlings will be affected by the degree to which the varieties are self-fertile,[1] as well as by the cross-pollination to which they are exposed. Of the varieties in group 1, Josephine and Beurre Bosc are self-fertile. Open-pollinated seedlings of these varieties are likely, therefore, depending upon the cross-pollination available, to include a greater or less number of selfs, which will be a disadvantage, as these will be of poorer vigour than if pollinated with varieties in groups 2 or 3. Glou Morceau is self-sterile. Open-pollinated seedlings of Packham's Triumph, which is virtually self-sterile, will be mostly cross-pollinated, whilst those of Winter Nelis, which is self-fertile, will, to some extent, be the result of selfing. The varieties in group 3, except Williams, are self-fertile, which, in these inherently vigorous varieties, is advantageous ; cross-pollination with any of the varieties under discussion, other than those in group 3, will tend to reduce the vigour of their seedlings.

As commercial sources of seed, therefore, the indications are that seed in which the varieties of group 1 entered into the parentage would not be selected. In this connection, it is of interest that Mr. Broadfoot, of the New South Wales Department of Agriculture, has found open-pollinated seedlings of Josephine to be a consistently poor rootstock, the seedlings being of poor vigour and the varieties worked on to them showing poor growth or high mortality.

On the other hand, varieties of inherently good vigour in group 3 are indicated as a source of commercial seedlings. Canneries using Williams would probably

be the main source of seed, although fresh fruit of other varieties producing inherently vigorous stock is by no means out of the question as a practicable source of seed. With Williams there is scope for seed selection in regard to the male parent. The variety is practically self-sterile, results at Bathurst[5] showing 1·7 seeds per 100 self-pollinations. The indications are that cross-pollination with Winter Cole and other varieties of good inherent vigour will give more vigorous seedlings than cross-pollination with Packham's Triumph with which Williams is more widely planted.

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TECHNICAL NOTES

THE AZALEA WHITE FLY IN AUSTRALIA.

Early in 1942, several specimens of azalea leaves infested with a white fly were received by the Victorian Department of Agriculture for examination. Through the courtesy of the Imperial Institute of Entomology, London, the species present has now been identified as the Azalea White Fly, *Aleurodes azaleæ* B. and M., an insect not previously recorded from Australia.

A. azaleæ was described by Baker and Moles[2] in 1920 as a new species from specimens intercepted by plant quarantine inspectors on shipments of *Azalea* sp. from Belgium, Holland and Japan. On these specimens it occurred frequently, but was not abundant, only four or five pupa cases being found to a leaf, and did not seem, at that point, to be injurious. A previous report[1] in 1917 refers to *Aleurodes* spp. being intercepted in Nebraska on azaleas from Belgium, and probably refers to the same species, and Essig[3] in 1926 reports that the species occurs on azaleas imported from Japan and Europe and has been taken in California and other States of U.S.A. Mackie[5] in 1936 reports the species as being observed on azaleas, and in 1937[6] states that *A. azaleæ* B. and M. showed a marked increase in distribution on azaleas.

In Victoria, the species was found in two commercial nurseries occurring on azaleas labelled as *Azalea ledifolia* Hooker and *Azalea magnifica* Hort., which are, I understand, synonymous with *Rhododendron* (*Azalea*) *mucronatum* Don. and *Rhododendron* (*Azalea*) *mucronatum* var. *Sekidera* Wilson. Both of these species are characterised by extreme production of hairs on the lower surfaces of the leaves. It is with respect to this character of the host plant that Azalea White Fly differs so markedly from the Rhododendron White Fly, *Dialeurodes chittendeni* Laing, which attacks chiefly plants with smooth lower surfaces of the leaves.[4] On no other species of azalea or rhododendron or other plant has Azalea White Fly been observed in Victoria.

The species here occurs very abundantly on the lower sides of the leaves (Figure 1), with the emergence of adult white flies first taking place during November and continuing throughout the summer until February, when emergence apparently ceases. The populations on the leaves become so heavy with continuous breeding throughout the summer months and the production of " honey dew " so copious that by the autumn the infested azaleas are covered with black, sooty mould. Spring flowering is, however, not seriously interrupted.

Figure 1.
Azalea White Fly (*Aleurodes azaleæ* B. and M.) on *Rhododendron mucronatum* Don., Victoria.
[Photo : L. W. Miller.

Although the parasite *Encarsia pergandiella* Howard has been observed on this species by Mackie[5] in California, no parasites have been found in Victoria. Attempts to utilise *Encarsia formosa* Gahan bred from *Trialeurodes vaporariorum* Wwd. on this species repeatedly failed in this State.

Satisfactory control of this insect on azaleas was obtained by spraying with a white oil-nicotine sulphate mixture consisting of one pint of white oil, one ounce of nicotine sulphate and five gallons of water, sprayed upwards into the plant.

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ATTEMPTED FROST PROTECTION OF SULTANA VINES WITH A PETROLEUM SPRAY.

A news item published in the September, 1938, issue of the Australian " Fruit World and Market Grower ", discussed the possibilities of protecting vines from frost damage by delaying the sprouting period following the application of oil sprays to the dormant vines. The original work was carried out in Germany by Professor Schanderl-Geisenheim and was described in international records of research work.

The matter was brought to the notice of the Shell Company of Australia by a South Australian vine grower, Mr. Hunt, and a trial was arranged on his property at Monash in 1939. The results were lost owing to successive very late frosts followed by drought, but sufficient promise was shown to justify further trial.

In 1940 the Shell Co. repeated the trial at Monash, and cooperated with the Commonwealth Research Station, Merbein, in arranging a trial at that Station. The South Australian Department of Agriculture also carried out similar tests at Glossop. In 1941, the trials at Glossop and Merbein were repeated and a further trial was commenced by the New South Wales Department of Agriculture at Yenda. The last two trials were also repeated in 1942.

In most trials, the oil spray has been applied to the dormant vines from a hand-operated knapsack spray, the oil employed for most of the work being a common horticultural summer spraying oil of the stock emulsion type embodying a " technical white " oil.

It is assumed that any degree of frost protection given by the oil spray is due solely to delayed budburst and not to any intrinsic frost resistance conferred by the oil. The accepted " danger period " for frost damage to vines in the Murray Valley extends from budburst in early September to mid-October.

Factors Affecting Delayed Budburst.

Delayed budburst has occurred with all treatments in varying degrees. The method whereby the oil causes the delay is not understood. Up to 11 days' delay in the time required for a given percentage of dormant buds to burst, has been observed (see Figure 1). The maximum delay extends over the latter half of September covering about half of the " danger period " and affording protection to about two-thirds of the buds that eventually sprout.

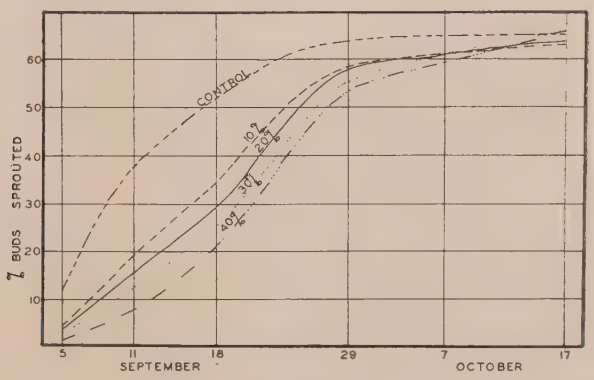

Figure 1.
Effect of increasing concentration of " Technical White " oil emulsion on delay of bud burst of sultana vines at Commonwealth Research Station, Merbein, 1942.

A number of oils of varying viscosity have been tried and both very high and very low viscosity oils have shown little effect. A common summer spraying oil (viscosity 60-70 R.1 at 100° Fah.) typifies those causing the greatest effect.

Concentration of oil appears a most important factor and a range from $2\frac{1}{2}$ per cent.-100 per cent. has shown increasing delay of budburst with increasing concentration. Concentrations below 10 per cent. show small but significant effects compared with controls, and between this value and 40 per cent. each increment of 10 per cent. shows a regular increase in the delay of budburst.

Time of application of the spray has an effect that appears to be dependent on the season. In the dry winter of 1940, sprays applied approximately 8, 5 and 2 weeks before budburst gave similar results, but in both 1941 and 1942, when rain occurred between sprayings, the intermediate application gave greatest delay.

Type of application has not been an important factor. Spraying the canes, or even merely painting the buds, has given almost as great an effect as a prolonged spraying of the whole vine including the canes, crown and butt.

TABLE 1.

Analysis of Variance of the Inverse Sine Transformation (Degrees) of Per cent. Buds Burst 11th September, 1942.

Due to.	Degrees of Freedom.	Sum of Squares.	Mean Square.	Significance.
Blocks	1	43·0	43·0	
Concentration (0, 10, 20, 30, 40%) ..	4	3112·1	778·0	P=0·001
Time (8, 5, 2 weeks before bud burst) ..	2	1551·8	775·9	P=0·001
Type of spray (canes only ; whole vine)	1	53·8	53·8	
Concentration × Time	6	77·7	12·9	
Concentration × Type	3	5·8	1·9	
Time × Type	2	0·1	0·05	
Concentration × Time × Type	6	57·2	9·5	
Residual	34	466·1	13·7	
Total	59	5367·6		

TABLE 2.

Treatment Means expressed as Percentages and Transformed Values (Degrees), and the Difference for Significance, in Degrees, at P=0·001.

	Concentration of Oil in Per cent.					Time in Weeks.		
	0	10	20	30	40	8	5	2
Degrees	37·7	25·9	23·1	20·6	16·4	20·9	14·9	28·8
Per cent. Bud Bust	37·4	19·1	15·4	12·4	8·0	12·8	6·6	23·1
Difference for Significance	5·3 degrees					4·7 degrees		

The analysis of a spring bud count given in Tables 1 and 2 demonstrates the typical differences that are obtained from bud counts throughout September (see also Figure 1).

Health and Yield of Vines.

Toward the end of September, differences in the percentage of buds burst, due to the various treatments, commence to vanish and do so entirely by early October. Nevertheless, during the spring the individual shoots of the oil-treated vines are markedly delayed in growth compared with untreated vines (see Figure 2).

The treated vines reach normal appearance by harvest and although high concentrations of oil have reduced yields of fruit in some trials, the reductions have not been significant. No other estimate of vine vigour such as weight of prunings, or number of canes laid, has shown any difference between treatments.

Figure 2.
Delay in growth of vines sprayed in winter with 40% " Technical White " oil emulsion. Unsprayed vines are to the left of the posts. Photographed 22nd October.

Although there is little evidence from these trials of the susceptibility to frost damage of delayed buds, two severe frosts were experienced at Glossop on 13th and 17th September, 1941. On untreated vines, 14 per cent. of the buds were killed by frost ; on vines sprayed with 5 and 15 per cent. oil, 7 and 1.2 per cent. respectively were frosted. The final harvest yields reflected these figures.

The treatments are being continued on selected trials, and spring bud counts obtained, although harvest yields may not be obtainable until normal times return, when the cumulative effect of the treatments on yield can be noted.

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TRANSMISSION OF SPOTTED WILT THROUGH POTATO TUBERS.

In February, 1941, single tubers were harvested from each of a number of potato plants of the variety Factor infected with spotted wilt at Crookwell, New South Wales. These tubers showed the distortion and cracking characteristic of early infection with the disease. Circumstances prevented planting of the material until December, by which time it was badly shrivelled. However, a portion of each tuber was cut off and planted in a bed in the greenhouse. Of the 52 index pieces planted 51 germinated, and 16 of these or 31 per cent. showed symptoms of spotted wilt, the remainder producing healthy plants.

Symptoms varied considerably, but the general picture was as follows: the first small leaves bore a strong mottle with dark green blisters or sometimes dark green rings, but were not distorted. As the plant grew the new leaves were symptom-free for a time but then necrotic spots and ringspots appeared and spread. The young top growth remained symptom-free for 2 to 7 weeks, but finally general necrosis set in and the plant rapidly collapsed from the tip downwards. The onset of this necrotic collapse was very variable. Some plants collapsed in 2 or 3 weeks after attaining a eight of only 1 or 2 inches. Other plants reached a height of 9 to 12 inches and survived for 5 to 7 weeks. Four of the 16 plants produced fresh basal shoots when the tops had been killed back and these, although they ultimately became involved in necrosis, enabled the plant to survive 8 weeks or longer.

Thirty-three of the tubers from which these plants had been grown were planted in the field. The soil was dry and extremely dry hot conditions prevailed during the period of their observation. Only 16 of the tubers grew. Of these, 3 produced plants that showed necrotic dieback and necrotic girdling of the base of the stem. New basal shoots were produced and several of these remained free from necrosis although the leaves were yellowish, hard and partly rolled. One of these plants produced typical spotted wilt symptoms when inoculated in the greenhouse. The plants were still alive two months after planting but were then destroyed by the potato moth.

It is apparent that plants arising from infected tubers in the field may survive long enough for thrips larvae to acquire the virus, pupate and emerge as infective adults capable of transmitting the virus to healthy potatoes. Such plants are thus a likely source of infection wherever spotted wilt occurs in potato crops. However, since a generation of thrips must develop on diseased plants before current-season transmission can occur, new infections arising from these *internal* sources will not appear while the potato crop is in the early stages of growth, probably not for 6 or 8 weeks after emergence. Symptoms of infection from *external* sources might occur any time from about 2 weeks after emergence, this 2 weeks being approximately the incubation period of the virus in the plant.

The experiment described herein* shows that tuber transmission of spotted wilt may occur in the greenhouse and field. Its effectiveness as a means of spreading spotted wilt on the farm is a matter for future observation and experiment. In a crop grown from good quality seed tubers it is not likely to give rise to many infection centres. Seed tubers showing the typical distortion and cracking caused by the disease would be graded out, and of those remaining only a relatively small proportion would produce diseased plants. Little serious reduction in yield of ordinary table potatoes is likely to be due to infection from these primary centres within the crop. Severe losses occur mainly in coastal and suburban areas where a variety of garden plants and weeds act as a breeding ground of both virus and vectors, which then invade the near-by potato crops.

* Several other experiments involving only 2 or 3 tubers at a time were made during a period of 6 years, but all gave negative results.

Tuber transmission of spotted wilt in certified stocks and other potato crops grown for seed is a more serious problem. If unchecked the disease might multiply during a series of years until the damage caused by it became sufficiently severe to lower the quality of the affected seed stock. In certification the disease cannot safely be ignored as non-transmissible through the tuber. Diseased plants should be rogued and a maximum tolerance fixed. The tolerance might be considerably higher than for other virus diseases, but the exact level can only be discovered by further observation and experiment under a variety of conditions.

D. Norris.
J. G. Bald.

Division of Plant Industry, C.S.I.R.,
Canberra, A.C.T.

(Received for publication, 11th February, 1943.)

THE EFFECT OF ZINC OXIDE ON THE CUT SURFACES OF POTATO TUBERS.

Various methods of disinfecting the cut surfaces of seed potatoes before they are planted have been recommended or put into practice.[2] Of the materials used, many are likely to prevent the cut surfaces from suberising, so that the seed pieces may become more susceptible to rotting organisms than cut seed pieces planted without treatment. Preliminary experiments have shown there is one possible disinfectant, zinc oxide, that does not inhibit suberisation to any noticeable degree.

Zinc oxide was first tested by sprinkling the powder over the surface of wet sand, placing cut tubers with the exposed surfaces on the treated sand, and leaving them until suberisation was complete. After a week or more at mean temperatures around 70° F. the surfaces were quite clean, and as well suberised as those of control setts lying on wet sand without zinc oxide. Control setts in sand wetted with Cheshunt mixture failed to suberise at all.

Later, at Gatton, Queensland, 2-3 cwt. of cut seed tubers of the variety Up-to-Date were treated by dipping the exposed surfaces into a thick milky suspension of zinc oxide before the setts were planted in the field. The tubers were cut, treated, and planted on the same day. Emergence of these plants was prompt, and almost complete (98 per cent.). At late flowering, when the plants had already formed quite large tubers, a number of them were dug. The seed pieces were still firm and sound. Several setts that had failed to produce plants were also dug, and were found to have formed small tubers at the eyes instead of sprouts. They were as sound as when they were planted.

It appears that zinc oxide has not the usual effect of heavy metal compounds on the cut surfaces of tubers. As it is well known to be a practical seed disinfectant,[1] it may have possibilities as a preventive for the rotting of cut potato setts under conditions where rotting is likely to occur. If its protective action is found to be commercially useful for potatoes, its harmlessness to the cut surfaces of tubers (it is equally harmless to the eyes and sprouts) would render its application relatively easy and safe.

References.

1. Haskell, R. J., and Doolittle, S. P.: U.S. Dept. Agric. Farmers' Bull. 1862, 1942.
2. Lutman, B. F.: Vermont Agric. Exp. Stat. Bull. 418, 1937.

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THE EFFECT OF BIOTIN AND THIAMIN ON THE GROWTH OF FUNGI ISOLATED FROM LESIONED ROOTS OF TAKE-ALL AFFECTED WHEAT.

In an investigation on the microfloral succession in lesioned roots of take-all affected wheat, the writer found that, as the disease progressed, *Ophiobolus graminis* was replaced by other fungi. Because *O. graminis* is known to require biotin for growth, this replacement by other fungi might be explained on the basis of competition between them and *O. graminis* for biotin. These fungi were therefore tested for biotin and thiamin requirements in a synthetic solution, consisting of glucose, ammonium nitrate and mineral salts. The results are shown in Table 1, where − =no growth, + =growth, and ++ =increased growth.

TABLE 1.

Relative Growth of Fungi in Solutions with and without Biotin and Thiamin.

Fungus.	Basal Solution.	Basal Solution plus Biotin.	Basal Solution plus Thiamin.	Basal Solution plus Biotin and Thiamin.
Ophiobolus graminis	−	+	−	++
Helminthosporium sativum	+	+	+	+
Wojnowicia graminis	+	+	+	+
Fusarium culmorum	+	+	++	++
Fusarium sp.	+	+	++	++
Hormodendron sp.	+	+	++	++
Chætomium sp.	+	+	+	+
Sordaria sp.	+	+	+	+
Curvularia sp.	+	+	+	+
Alternaria sp.	+	+	++	++
Alternaria sp.	+	+	+	+
Cladosporium sp.	+	+	++	++
Trichoderma lignorum	+	+	+	+
Trichoderma sp.	+	+	+	+
Penicillium sp.	+	+	+	+

O. graminis was the only fungus requiring a supply of biotin for growth, which indicates that competition for this substance in the root tissues is not a factor concerned in the replacement of *O. graminis* by other fungi. It will be noted that the growth of some of these fungi is augmented when supplied with thiamin.

Some of the fungi usually isolated, along with *O. graminis*, from lesioned wheat roots, resemble *O. graminis* in culture, and are non-fruiting under ordinary cultural methods. In order to eliminate isolates suspected of being *O. graminis* from the special cultural work needed for the final identity of that fungus, use may be made of the fact revealed in the above table by merely inoculating a biotin-free synthetic solution with all isolates assumed to be *O. graminis*. Growth of any isolate on this solution would establish that it is not *O. graminis*.

N. H. WHITE.

Division of Plant Industry, C.S.I.R.,
Canberra, A.C.T.

(Received for publication, 2nd November, 1942.)

The Australian Institute of Agricultural Science

THE NEW PRESIDENT.

Dr. G. A. Currie, who as the fifth President of the Institute assumed office at the fifth general meeting, is Vice-Chancellor and Hackett Professor of Agriculture in the University of Western Australia. He accepted the Chair of Agriculture in 1939 and during the next year was appointed Vice-Chancellor for a period of two years, at the expiration of which he was reappointed for a further term of seven years.

Professor Currie, who was born in Scotland, received his education at Keith Grammar School, Banffshire, and the University of Aberdeen, where he graduated B.Sc., later B.Sc.Agr., and in April, 1936, was admitted to the degree of D.Sc. During the Great War he was on active service from 1915 to 1918.

Some twenty years ago, Dr. Currie came to Australia, and after three years' experience in tropical agriculture in Queensland, he spent a year as assistant to the Commonwealth Cotton Entomologist at Biloela, Queensland, and a further two years as Assistant Entomologist with the Queensland Department of Agriculture and Stock.

In 1929 he joined the Council for Scientific and Industrial Research as Officer-in-Charge of the Noxious Weeds Section, and during the next ten years he was responsible for directing and carrying out numerous investigations for the control of a great variety of weeds and some pasture experiments. In connection with his work with the C.S.I.R., he travelled abroad in 1937 and attended the International Grasslands Congress at Aberystwyth and the British Science Congress at Nottingham.

Apart from his official work, Professor Currie has taken an active interest in scientific organisations. He was organiser for the Science Congress at Canberra in 1939 and, among Institute activities, has been Branch Editor for the A.C.T. Branch and President of the Western Australian Branch.

The President's Message.

The following are extracts from the President's message, which was read on his behalf at the fifth general meeting :

The choice of a president from a remote State stamps the Institute as a truly Federal body. The outstanding contribution which the Institute has made to its members is that feeling of all-Australian unity, the feeling of belonging to an Australian professional group.

Judging from recent accounts, the problem has arisen in the Institute of developing central control without losing branch energy. It is the old problem of giving the utmost possible autonomy to individuals and to branches so that the springs of personal energy of members shall not be dried up, while energy and ideas are canalised where necessary in the central body to give effectiveness to them. I am sure the problem can be solved so long as branches have a genuine team spirit and the central council encourages individual initiative and branch responsibility.

With other scientists, agricultural scientists have been inclined in the past to stick rather closely to their scientific last and to ignore the socio-politico-economic world around them. Now we find ourselves caught up in a breath-taking series of changes which will alter the whole structure of Australian agriculture.

I do not for a moment suggest that we should become any less conscientious as scientists in our special field of work, but I do think that the scientific method in which all our members are trained and experienced can play a big part in solving the many social problems which touch agriculture, and that our members should interest themselves in those problems and use the authority of the Institute whenever possible to further desirable ends associated with those problems.

Then the Institute may become a strong instrument, not only for promoting the special scientific interests of agriculture and legitimate aspirations of its members, but also for contributing to the social well-being of the whole agricultural community.

FIFTH GENERAL MEETING.

The fifth general meeting of the Institute was held on 20th November, 1942, at the School of Agriculture, University of Melbourne. Council had decided that the times and circumstances were inappropriate for anything more than a formal general meeting, and apart from the election of President, the chief business transacted was the adoption of the Annual Reports of the Council and of the Qualifications Committee, which are given in the following pages. The Statement of Accounts for the year ending 31st December, 1941, which appeared on page 174 of volume 8 of the Journal, was adopted and other business was briefly transacted.

Report of Council.

GENTLEMEN,

While officially this report covers the period to 3rd December, 1941, the date of this general meeting requires that comment be made also on Institute activities during the months of 1942 which have already passed.

In the period under review the organisation of the nation for production for purposes of a total war effort has progressed considerably. This is reflected in the demands now being made on the primary industries of Australia and on the services of the technical advisers to these industries. Arrangements have been made under which the utilisation of services of agricultural scientists is now carefully controlled, and also to ensure that the services of those members who can be released to the fighting forces are used to full capacity in the particular branch to which they are allotted. The Institute has accepted the responsibility of advisory work in connection with the utilisation of the services of its members. While the directness of the contribution of most members to the war effort has thus increased considerably during the period under review, The Institute as a corporate body is now rendering specific service.

Membership.—At 31st December, 1941, the membership of the Institute was 464 Corporate members and 25 Student members, the respective Branch totals being as follows :

	N.S.W.	Vic.	S.A.	Qld.	W.A.	A.C.T.	Tas.	Total.
Corporate	125	117	58	57	58	32	17	464
Student	17	1	5	—	1	—	1	25

After allowing for resignations, deaths and cancellations of membership, the net increase in the number of Corporate members for 1941 was 6. During 1942, 17 Corporate members and 7 Student members have been admitted to date.

According to present information the number of members of the Institute who have enlisted for service abroad, or are on full-time defence duty in Australia, is approximately 40. No reports of fatal casualties have been received, though one member is presumed prisoner of war in Malaya. There have been several cases of rapid promotion being obtained by members, and one decoration award. This was the D.F.C. which was awarded to Wing-Commander J. P. Ryland for services rendered in air attacks from northern Australia.

Your Council records with regret the death of Mr. M. S. Benjamin, a senior analyst employed in the Chemists' Branch of the New South Wales Department of Agriculture.

Branch Activities.—Attendances and discussions at Branch meetings have continued to be satisfactory. It has been noted that the subjects engaging the attention of branches have been of a somewhat broader nature than formerly, and on many occasions have concerned national planning and the organisation of agriculture. In several instances recommendations arising therefrom have reached the Council. To enable Council discussions on these matters to be expedited, arrangements have been made for the circulation of minutes of Branch Committee and general meetings. This has permitted principal delegates to instruct their proxies at Council meetings in the knowledge of the views held by other branches. It is hoped that this practice will continue as efficiently as it has during recent months.

Journal.—The changes in personnel of the Publications Committee, which were mentioned in the last report, took place at the beginning of 1942. The Council has conveyed its thanks to Doctors Bowman (Editor) and N. S. Noble (Business Manager) and the members of the Publications Committee for the excellent work they are doing on behalf of the Institute. In view of the

present financial position of the Institute, the Council has decided that the Journal shall be published without advertisements from Vol. 9, No. 1 (March, 1943), and that should the contributions to hand warrant it, and the paper supplies be available, the Publications Committee be authorised to increase the amount of printed matter in the Journal up to 16 extra pages per volume. It is considered that this action will help to consolidate the reputation of the Journal as an agricultural scientific publication.

Plant Quarantine.—The report of the Central Committee on Overseas Plant Quarantine was published in the Journal, Vol. 7, December, 1941. Reprints were obtained and circulated to all authorities interested in the subject of plant quarantine.

Agricultural Economics.—An interesting and valuable discussion as to Institute action in this connection has taken place during recent months. Much investigational work in agricultural economics has been required in the organisation of Australian primary production for war purposes. As there has been no special training in the subject, in most cases the work has had to be done by technical agriculturalists without economic training, or economists without agricultural training. Few will consider this a satisfactory state of affairs. As it is apparent that agricultural economics will continue to be of importance in the administration of Australian agriculture, your Council considers that steps should be taken immediately to institute suitable training in agricultural economics at Australian universities, and recommendations to this end have been submitted to the Commonwealth Government through the Australian Agricultural Council.

Qualifications Committee.—All applications for admission to membership have been examined by this Committee during the year. It was decided by Council that the Committee prepare annual reports showing the methods of dealing with different types of applicants. The first of these reports has been received from the Committee and is attached hereto.

Man-Power Arrangements.—In July, 1942, there was received from the Director-General of Man-Power an invitation to the Institute to nominate a Scientific Man-Power (Agriculture) Advisory Committee and Sub-committees to provide technical guidance for the Man-Power authorities in respect of agricultural scientific personnel. It was decided by Council to accept this invitation and to nominate as the Central Advisory Committee the Council of the Institute with Advisory Sub-committees in each State. These nominations were accepted by the Director-General and the committees appointed. The technical guidance required of these sub-committees is now an important function of Institute activities. There has not been any great movement or call-up of members whose cases have required examination by the sub-committees. However, the cases of members already in the services are being examined in the light of information provided by the sub-committees. Possibly the most important matters, at present under consideration, are those concerned with the employment of 1942 graduands from agricultural faculties, and the number of students which should continue to be admitted to these reserved faculties during the war. Consideration of these matters takes the Institute into a rather new field, in which it is concerned mainly with the affairs of prospective members of the Institute. However, the service is required, is well worth doing, and obviously comes within the terms of several clauses of the Memorandum of Association.

Organisation of Agriculture for War.—The existing arrangements for the organisation of Australian agriculture have been critically examined during recent months on the initiative of the New South Wales and Queensland Branches. At the present time this discussion is still proceeding.

In concluding this report, your Council desires to state its view that the agricultural industries of Australia will urgently require the services of scientifically trained personnel in the difficult years of adjustment which lie ahead, and that it trusts members will welcome the opportunities for service which will develop in many new fields of activitity.

For and on behalf of the Council.

J. A. Prescott,
President.

Report of the Qualifications Committee.

During the year 1941-1942 the Qualifications Committee considered 28 applications for admission to corporate membership. All applicants were recommended for admission. Most of the names submitted for the consideration of the Qualifications Committee have been of graduates in agricultural science who have qualified for admission under Section 4 *i.* Two names were submitted of candidates who had qualified in Science and who were engaged in work in agricultural botany, one applicant was a graduate in Arts and engaged in work in agricultural economics. These three graduates were recommended for election under section 4 *iii.*

Three candidates were recommended for membership under Section 4 *iv.* In two of these three cases the applicant held a technical diploma. All three were in the State services and held positions of substantial responsibility in the organisation of the particular branch of agriculture for which they were responsible.

During the year a satisfactory procedure was developed to avoid loss of time in securing the due election of the candidates. It has been arranged that so far as possible no names shall be submitted to the Council for election until the recommendations of both the State Committee concerned and of the Qualifications Committee can be jointly presented. Where a candidate seeks admission under Section 4 *iv*, the candidature becomes the subject of confidential correspondence between the President of the State Branch concerned and one of the members of the Qualifications Committee. Should the opinion of the Qualifications Committee be unfavourable, the State Committee may thus be given the opportunity of withdrawing the nomination. Generally speaking, in making a decision under Section 4 *iv*, the Committee has been guided by three aspects of the candidate's work and training : (1) the nature and amount of the formal training in agriculture and agricultural science ; (2) the degree of responsibility ; and (3) the contribution by publication or otherwise to the advancement of the application of science to the problems of agriculture.

J. A. Prescott, Convener.
Allan R. Callaghan.
Rowland Hill.

31st October, 1942.

MEETING OF COUNCIL.

A meeting of Council was held in the Director's Office, Department of Agriculture, Melbourne, on 30th November, 1942.

Present.—The President of the Institute, Professor G. A. Currie (in chair), Mr. H. A. Mullett (V.), Dr. A. E. V. Richardson (S.A.), Dr. H. C. Forster (W.A.), Mr. J. L. Provan (Q.), Mr. F. S. Crawford (T.), Mr. R. W. Prunster (A.C.T.), the Hon. Treasurer, Mr. R. L. Twentyman, and the Hon. Secretary, Mr. A. J. Vasey, and an apology was received from Mr. G. H. Vasey (N.S.W.).

The President opened a general discussion on the attitude and action to be taken following the appointment of Mr. F. W. Bulcock as Director-General of Agriculture, with particular reference to the proposal of the N.S.W. Branch that certain specific recommendations in regard to the organisation and staffing of his department should be made to Mr. Bulcock forthwith. The President suggested that the subject should be approached from the point of view of what he took to be the primary object of the Institute, *viz.* the welfare of its members that they might the better serve the agricultural industries of Australia and the community as a whole. It was left to the President and the Hon. Secretary to take appropriate action following receipt of delegates' comments on the suggestions put forward by New South Wales Branch.

Subject to confirmation by principal delegates, the following officers of the Institute were reappointed as for the year 1943 : Hon. General Treasurer, Mr. R. L. Twentyman ; Hon. General Secretary, Mr. A. J. Vasey ; Hon. Assistant Secretary, Mr. R. D. Croll ; Editor of the Journal, Dr. F. T. Bowman ; Business Manager of the Journal, Dr. N. S. Noble ; Members of the Publications Committee, Dr. H. J. Hynes (Chairman), the Editor and Business Manager, together with Dr. E. T. Edwards, Mr. F. C. McCleery, Dr. I. A. Watson. The appointment of the Qualifications Committee is to be considered at the first meeting in 1943. It was moved by the President : That the Council's thanks be conveyed to all officers of the Institute for their devoted services during the past year.

The Hon. Treasurer reported that the Institute should be in a position to maintain the branch grants for 1942 at the same rate as previously, namely 5*s*. 6*d*. per corporate member.

MEETINGS OF BRANCHES.

New South Wales Branch.

The main business of a meeting held on 27th November was an address by Mr. A. W. S. Moodie on " Land Tenure and Rural Reconstruction ".

Present land settlement policy in N.S.W. is based on the freehold system of tenure, under which the settlers' financial resources and a considerable proportion of the income produced on the farm are utilised in an endeavour to secure an asset. By substituting a system of Crown tenancy for the freehold system, it seemed evident that the settlers' original capital could be devoted to developing the productive capacity of the property, and that a proportion of the income could be devoted to the same purpose, instead of meeting repayments on capital and interest. Under a system of Crown tenancy the settler could be provided with reasonable housing conditions and other amenities often lacking under the freehold system.

Apparently a system of Crown tenancy had been tried in this State many years ago and had proved unpopular with settlers. This should not necessarily discourage the reintroduction of such a system, if it could be shown that the settler would benefit thereby. An improved form of tenancy under which the tenant would enjoy certain privileges, such as those conferred by the Agricultural Holdings Act, 1941, should prove acceptable to many prospective settlers, who are frequently unaware of the burden they assume in purchasing land under the freehold system.

It was pointed out that the provision of the capital necessary to develop agricultural land was a world-wide problem. Even in Great Britain, where, over centuries, the farms have been developed with capital supplied by successive generations of landlords and tenants, the need for still more capital for developmental work was stressed by agricultural authorities. This being the case, it was difficult to visualise the freehold settler being able to develop a property to its maximum productive capacity. Low production per unit was characteristic of Australian agriculture and the investment of capital in improvements was absolutely essential as a factor in surmounting this obstacle to economic production.

The speaker admitted that a corollary to Crown tenancy would be the introduction of land nationalisation, but pointed out that as a landlord the State would possess several advantages over private landlords. The State could initiate improvement schemes involving large capital outlay, and, if necessary, could replace uneconomic farm units. Standards of good cultivation could be enforced upon tenants in the national interest.

As the result of discussion, it was decided to ask Council to take steps to initiate studies on post-war reconstruction of agriculture by the various Branches as an Institute project. It was suggested that various Branches of the Institute might deal with different phases of reconstruction and that the N.S.W. Branch would be prepared to consider land tenure as one of its assignments.

A sub-committee, consisting of Messrs. Pawley (convener), Moodie, Brown and Parry, was appointed to report on what was being done by other organisations in considering post-war reconstruction, what aspects of rural reconstruction should receive attention by the Institute, and the place of land tenure in agricultural reconstruction.

The eighth annual general meeting of the New South Wales Branch was held at Science House on 12th February, 1943, at which the following officers were elected for the ensuing year : President, Dr. E. T. Edwards ; Vice-President, Dr. H. J. Hynes ; Hon. Secretary, Dr. S. L. Macindoe ; Hon. Treasurer, Mr. L. C. Holmes ; Committee of Management, Dr. E. G. Hallsworth, Messrs. W. W. Jones and D. O. Cross.

The meeting stood, as a mark of respect to the memory of the late Sergeant John Gollan.

Regarding an amendment to the Constitution which might affect Branch autonomy, a discussion took place, as a result of which an expression of opinion was formed for communication to Council and other Branches.

The main business of the evening was the address of the retiring President, Dr. H. J. Hynes, who spoke on " Rural Manpower Problems ", an account of which appears in this issue of the Journal.

Queensland Branch.

The final meeting of the Queensland Branch for 1942 was held on 30th November. Members of the Division of Plant Industry (Research) of the Department of Agriculture and Stock gave an account of soils and fertiliser work undertaken in vegetable growing areas.

Mr. W. A. T. Summerville outlined the programme of investigations and dealt in detail with bean fertiliser experiments and canning quality work. Trace element deficiency studies were also discussed. It was revealed that boron deficiency is widespread in the Brisbane district, particularly in beetroot.

Mr. L. G. Vallance discussed fertiliser trials in tomato-growing districts undertaken to determine whether standard complete fertilisers could be replaced by materials, such as blood and bone, which are available in greater supply.

Mr. F. W. Blackford described various vegetable disorders which are probably due to pH values of the soil, and discussed results from liming trials in progress.

Mr. C. W. Winders spoke on soil-moisture problems of vegetable growing with overhead sprinkling irrigation and mentioned cultivation and mulching trials under way.

Victorian Branch.

Members attended meetings of the Melbourne University Agricultural Society during November and December. On 20th November the Controller of Defence Foodstuffs (Mr. G. A. Davis) spoke on " Food and War ". Australian problems in this respect are different from those of the United Kingdom, tea and coffee being the only foodstuffs we imported from overseas.

Transport was an even more important factor than production, and Australia had more to feed per head of population in the forces than any of the allies. Food production and distribution were a collective problem dealt with by a combined food board in Washington, the London Food Committee and the Australian Food Council. Dehydration was of major importance, continued Mr. Davis, and there was also an enormous demand by civilians and the services for both fresh and canned vegetables. The difficulties encountered were political, social and technical, and the lack of trained personnel was a big handicap. The United States was not a vast reservoir of food, therefore Australia must produce to a maximum with special emphasis on processed foods. Mr. J. Douglass, who at the time was in charge of the vegetable programme for the Department of Supply, described methods adopted to bring Australia's vegetable production up to standard. Captains Seabrooke and Joslyn of the American Army also contributed to the discussion.

Captain M. A. Joslyn, a technical officer in the United States Army and a former Professor of Fruit Technology at the University of California, discussed "Food Technology Problems" on 11th December. He stressed the importance of the nature of the raw material for successful preservation. There was no short cut, he said to determining the right varieties of certain products to be grown for this purpose. Suitability of the product for canning depended on such factors as its ability to resist disease, maintain flavour and vitamin content. In addition it had to be an economical proposition for the farmer to grow. There were many mechanical difficulties associated with food preservation. These included washing out the dirt without bruising the product, sealing of the tin to protect the contents from the air, cooling, for which bacteriologically pure water was necessary, etc. Other means of preserving food described were the aseptical method used for fruit and some vegetables, but not for meat, storage at oxygen conditions unfavourable for the development of microorganisms, heat sterilisation, fermentation, freezing, drying and dehydration.

Current Notes and News

Rural Reconstruction Commission.

In a recent Press statement, the Minister for Post-War Reconstruction, Mr. J. B. Chifley, announced the appointment of a Rural Reconstruction Commission, the members being Mr. F. J. S. Wise, Minister for Agriculture in Western Australia (chairman); Mr. J. F. Murphy, Secretary of the Commonwealth Department of Commerce; Professor S. M. Wadham, Professor of Agricultural Science, University of Melbourne; and Mr. C. R. Lambert, Director of the Rural Debt Adjustment Board, New South Wales.

It was stated that the commission has been given a wide charter to investigate problems associated with primary industry generally. The Government expects the commission to submit specific plans for the rehabilitation of rural industries: for such extension or rearrangement of primary industries as may be considered necessary, having regard to markets available or likely to be available externally and internally in the post-war period; and for the improvement of conditions of life in the rural areas.

The commission is an integral part of the organisation which is being set up by the Government to plan for post-war reconstruction. It will work in close collaboration with the Ministry of Post-War Reconstruction. Its recommendations may thus be readily embodied in general plans being prepared by that Ministry.

Investigation of Guayule in South Australia.

Arrangements were made, in July, 1942, for investigations of the Mexican guayule plant (*Parthenium argentatum*) to be carried out at the Waite Institute on behalf of the Division of Plant Industry, C.S.I.R. The work was placed under the direction of Professor Trumble.

Some plants of guayule have been grown by the Plant Introduction Section at Canberra since 1931, and viable seed has apparently been produced by these plants each season. Supplies of seedlings and of seed for experimental purposes were forwarded in late July from Canberra to the Waite Institute, where 30,000 seedlings in all were raised under glasshouse conditions. These were subsequently planted out at Adelaide and at 50 country centres, to determine the conditions of soil and climate, including irrigation at some centres, under which the plant is most likely to produce maximum yields of rubber. From these tests it is intended to select areas for further experimental plantings on a commercial scale in 1943.

Considerable difficulty was experienced in establishing very young seedlings in August and September, but success was obtained in October and November, by which time robust plants were available. At some centres, growth has been vigorous during summer, and a fairly definite indication is now available as to the types of soil on which guayule is likely to succeed in South Australia.

At the Waite Institute investigations are in progress in pot cultures and in the field to determine the effect of different frequencies and amounts of artificial watering on the production of both seed and rubber hydrocarbon. Response to fertiliser treatment is also being tested. The course of rubber formation in different parts of the plant is being examined both chemically and anatomically.

Doctorates Conferred.

At the last annual commemoration of the University of Adelaide the degree of Doctor of Science was conferred on Mr. C. S. Piper. On graduating B.Sc. in 1922, Dr. Piper was appointed to Roseworthy Agricultural College as Assistant Chemist, and he remained there until joining the staff of the Waite Agricultural Research Institute, at its inception in 1925. His work at the Waite Institute has been particularly connected with the investigation of trace element deficiencies of plants and in the development of improved methods of analysis. His book " Soil and Plant Analysis " was recently published in Adelaide as a monograph from the Waite Agricultural Research Institute.

Dr. Piper is actively interested in several of the professional and scientific societies in Adelaide. Besides being treasurer of the local branch of the A.I.A.S., he is on the Council of the Royal Society of South Australia and is Vice-President of the South Australian Branch of the Australian Chemical Institute.

Lieutenant H. E. Young, of the Australian Army Medical Corps, recently received the first doctorate in Agricultural Science to be awarded in Queensland. Dr. Young obtained his bachelor's degree in 1932, served for a short period as pathologist in the laboratory of the Brisbane General Hospital, and was then appointed to the State Public Service as Plant Pathologist, specialising on forestry problems. He was awarded his master's degree in 1936 for work in this field. His doctor's thesis embraced a detailed study of fused needle disease of *Pinus* and its relation to nutrition in the genus.

Survey of Extension Services in New South Wales.

Following a discussion of " How Agricultural Scientists may aid Primary Production ", at a joint meeting of the New South Wales Branches of the Institute and the Australian Veterinary Association, held in May, 1941, a joint committee of the two bodies was appointed to study extension services in New South Wales. Although the subsequent war situation affected the recommendations that were reached, the committee made a survey of the extension services in the State, which may prove of wide interest, and is given below.

The existing extension services available to primary producers include the following organisations :

(*a*) *Rural Bank.* General addresses on agricultural topics with special reference to rural finance are given by senior officers to conferences convened by the Agricultural Bureau and other primary producers' organisations. A staff of 27 valuers visits over 6,000 property owners per annum. These men give a certain amount of practical advice on many agricultural subjects.

The Bank has sponsored publication of several attractive pamphlets and reports (soil erosion, grasshoppers, weed control, etc.). It conducts two ten-minute radio programmes weekly over nine major and six subsidiary country stations and has cooperated in this activity with the Department of Agriculture for the past twelve months.

Films are shown and lent. The best known are " The Menace of Erosion ", produced for the Soil Conservation Service, " Pigs to Market ", for the Department of Agriculture, and " The Red Terror ", for the Bush Fires Advisory Committee.

(*b*) *The Royal Agricultural Society.* The main extension work of this body is represented by the Royal Easter Show. Championship competitions, as designed by the Department of Agriculture, are sponsored in conservation of fodder, field maize, field wheat and grassland improvement. Officers of the Department of Agriculture act as judges and the competitions have a definite educational value.

(*c*) *Department of Education.* (1) *General.* Elementary instruction in horticulture is given in primary schools. Courses in agriculture cater for some 2,500 pupils in 3 Agricultural High, 10 High, 4 Intermediate High, 14 District Rural and 10 Public Schools. Many teachers take part in Agricultural Bureau and Junior Farmers' Club activities.

The Junior Farmers' Clubs have 10,000 members in two age groups, 10-15 and 16-20 years respectively. The Clubs are helped by the Department of Agriculture, by the supply of literature, by the judging of competitions and by lectures and demonstrations at field days, club shows and district and R.A.S. shows.

(2) *Technical Education Branch* (Technical College). Of the Technical College courses which may be considered agricultural extension, the best known is that in sheep and wool classing, which may be taken as a full three-year certificate course (oral and practical) in Sydney, or, in part, in country centres, or by correspondence. There are 17 full-time instructors in country centres. Other courses are: Agriculture (oral, full certificate, three years: correspondence, two years); Farm Mechanics and Blacksmithing (oral and practical at country centres); and the following one-year correspondence courses: Animal Husbandry, Farm Mechanics, Diesel Engine Operation, Motor Mechanics, Farm Bookkeeping.

About 90 per cent. of the persons taking the correspondence courses in Agriculture and Animal Husbandry are engaged in agricultural work. They are encouraged to join Junior Farmers' Clubs or Agricultural Bureau Branches according to age; emphasis is laid on practical work in all courses.

(*d*) *Department of Agriculture.* This is the most important extension organisation in the State. There are within the Department, the Hawkesbury Agricultural College and five divisions more directly and three less directly concerned with extension. These are listed below:

Plant Industry. (Approximately 90 officers.) Among these are special instructors (4), agricultural instructors (24), agrostologists (14) and plant breeders (11).

This Division controls ten experiment farms and two stations where its extension personnel receive early training in field practice, and where investigations are in progress with the object of solving local problems, adapting to local conditions the results of research elsewhere, producing improved varieties, etc. Seven of the farms have accommodation for students, though this accommodation is at present being used at two only.

Animal Industry. (Approximately 120 officers.) Among these are veterinary officers (20), stock inspectors (52), instructors in sheep and wool (12), in poultry (8) and in swine (6). The administration of Acts designed to assist the industry forms the chief part of the work of stock inspectors and some veterinary officers.

The Division has a research station (Glenfield) and the several branches conduct research at the experiment farms referred to above.

Dairying. (Some 38 officers.) These are for the most part dairy instructors and supervisors charged with the administration of the Dairy Industries Act and helping farmers and manufacturers towards more successful production.

Horticulture. (Some 70 officers.) The most important groups are fruit instructors (11), orchardists (9) and inspectors (45). The last-mentioned are concerned with the administration of Acts and are not necessarily fruit experts.

The majority of the officers in these four Divisions are stationed in country districts and deal directly with individual primary producers by visiting farms. Group extension work mainly takes the form of writing for the local Press and addressing meetings.

Information and Extension. (7 officers.) The work of the Division includes: Publication of the *Agricultural Gazette*, departmental books and leaflets, weekly notes to the Press and special articles to selected district Press; management of the Department's library and the provision of facilities for country as well as city officers; the training of officers of the Department in extension methods; the organisation of voluntary extension workers, for example, through the Agricultural Bureau, which has some 350 branches working through 10 district councils and an advisory council.

There are three Divisions less directly concerned with extension, namely: Science Services, with a personnel of about 40 in four branches. The correspondence associated with routine diagnostic work may be considered as extension work. In addition, specialists contact extension officers or the farming community, mainly through lectures, publications and correspondence. Marketing. The Division is concerned with extension services in that it supplies data as to commodity prices and crop prospects. Economics. This recently established Division is engaged in research in land use, farm management and such problems as the disposal of surplus foodstuffs.

Correspondence

The Efficiency of Organic Materials in Supplying Nitrogen to Crops.

Editor,
Journal A.I.A.S.

Sir,

An article, by Parbery and Swaby, under the above title, appeared in the August number of the *New South Wales Agricultural Gazette*. While I agree generally with what these authors have to say, I entirely disagree with the way they say it. Although it was probably not the intention of the authors, the average reader would obtain the impression that leguminous crops, generally speaking, are no better than non-leguminous crops for green manuring.

It is well known that the nitrogen content of both leguminous and non-leguminous crops varies considerably with a number of factors. In particular, herbaceous plants are richest in nitrogen content per unit weight in the seedling stage and the percentage of nitrogen progressively decreases, as maturity is reached. No one will dispute this. However, it is also well known that leguminous plants have generally speaking a much higher nitrogen content than non-leguminous plants.

It is generally agreed that where the nitrogen content of organic matter is below about 2 per cent. (dry weight) decomposition in the soil will reduce soil nitrate, while where it is above about 2 per cent. nitrates will be formed.

Leguminous plants generally have a nitrogen content well above 2 per cent. at the stage in which they should be turned in, while non-leguminous plants usually have a nitrogen content well below this.

It must be remembered also that non-leguminous crops obtain all their nitrogen from the soil, so that there is no net gain in nitrogen by growing and ploughing them under.

After a non-leguminous crop has been harvested from the land, the soil is at a very low nitrogen status. No non-leguminous crop will then grow satisfactorily on the land unless given heavy dressings of nitrogen or until after a satisfactory fallow period. However, it is quite practicable to grow any recognised green manure crop such as Tick beans, field peas, tares or cow peas. It does not matter how much straw trash is on the soil so long as the seed germinates and sufficient water is available the leguminous crop will grow quite well. Under such conditions practically all its nitrogen is obtained per medium of the Rhyzobia.

It is of course necessary to plough the green manure crop under before seeds begin to form or before the stems become woody. It is also true that if the soil is not properly supplied with the suitable strain of Rhyzobia the leguminous plant may be no better than a non-leguminous plant ; but where a new leguminous crop is being grown for the first time, this can easily be corrected.

While therefore it is admitted that under certain conditions non-leguminous crops may be as good for green manure as leguminous crops, nevertheless under most practical conditions we can say that ploughing under bulky non-leguminous crops leads to a depression of nitrates in the soil and is a bad thing for the following crop, whereas ploughing under bulky leguminous crops (say in the early flowering stage) leads to a rapid formation of ammonia and nitrates which is an immediate benefit to the following crop.

The actual response of crops to green manure depends on a large variety of factors. For example, if green crops are ploughed in late autumn there may be practically no decomposition until well into spring, whereas if they are ploughed under in the summer decomposition will be very rapid. One therefore gets different results when somewhat similar types of experiments are repeated.

Parbery and Swaby indicate that their experiments were exploratory, so that it is unfortunate that they felt it necessary to publish the results of one set of pot experiments—which they admit must be rather artificial—in a journal published specially for the benefit of practical farmers, and to write up the results in a way which might mislead farmers.

There are some special cases when green manuring is impracticable. For example, for the control of certain insect pests and certain fungus diseases of particular crops plants a long period of fallow may be necessary. However, disregarding such special considerations, and confining ourselves to temperate climatic conditions, it is quite safe for us to urge farmers to grow leguminous green manure crops, but not to grow non-leguminous crops for green manure—this being particularly important with wartime restrictions on the use of nitrogen fertilisers. If we do this we will be right in ninety-nine cases out of a hundred. We need not confuse the issue with technicalities.

Eric S. West.

Irrigation Research Station, Griffith, N.S.W.,
4th September, 1942.

Book Reviews

AUSTRALIAN INSECTS, by Keith C. McKeown, F.R.Z.S.

(*Pp. xxv+304, with over 400 figures. Royal Zoological Society of N.S.W., Sydney.* 1942. *Price 7s. 6d.*)

Keith McKeown, the well-known author of several popular books dealing with Australian nature study, has now produced a further handbook which fills a long-felt need in Australian entomology from a layman's point of view. Not since Froggatt's classical *Australian Insects*, published in 1907, have we had such a wealth of fact and picture as in this latest book.

The author makes no apologies at the outset for his lack of knowledge of certain groups of insects, and points out quite justifiably that the amateur nature observer, as well as the trained scientist, can make his or her contribution to the many gaps that exist in our knowledge of the life history and habits of the majority of our native insects. In this regard, he stresses the necessity for careful observation and the making of the fullest possible notes on any study that may be undertaken. This handbook makes no pretence at being a text book in the fullest sense of the word, but a reference guide whereby students and amateur collectors can more fully appreciate the many insect species about them.

The book is comprised of twenty-five chapters, the two opening ones being devoted firstly, to a well-written, concise description of the insect's part in the general scheme of nature, while secondly, a thoroughly simple scheme is put forward, with drawings, to illustrate insect structure and classification, which, while being strictly accurate, is readily understandable by even the veriest novice.

The remaining chapters are devoted in some detail to each of the orders of insects in turn, and it is here that the author has put to the best advantage his wide experience, both as a field collector and as a museum specialist. One of the features of these chapters, and incidentally the book as a whole, is the wealth of illustrative matter, both line drawings and photographs, that are used, more than four hundred figures being used to illustrate the text. One is a little disappointed, perhaps, that more original photographs were not used for illustrations, but with drawings of such a high standard available from the Department of Agriculture, New South Wales, this apparent drawback is not as real as it may appear at first sight.

The concluding chapter on the collection and preservation of insects will appeal to all collectors, and particularly to those young students who are commencing their own collection or making original observations on some particular phase of entomology.

Taken altogether the book can be commended as a worthy and modern successor to Froggatt's *Australian Insects*, and can be recommended to teachers and students alike as an authoritative handbook on Australian insects.

R. T. M. Pescott.

STUDIES OF THE IDENTIFICATION OF TIMBERS, WITH A NOTE ON THE SEASONING OF WOOD, by Alexander L. Howard.

(110 *pages. McMillan, London.* 1942. *Price* 36*s. sterling.*)

This book will be welcomed by all interested in timbers, especially their identification. The author advances the opinion that a transverse section of wood under magnification is a reliable aid to identification and includes 504 photomicrographs of some of the more important timbers of the world. These are all of uniform magnification, being ×10 throughout. This means that examination with a good pocket lens of a cleanly cut portion of the transverse section of any particular timber can be made and compared with the photomicrographs. It is not claimed that the species dealt with represent anything but portion of the world timbers, and it is proposed to issue supplements. A fairly representative number of Australian timbers is included, but one notices that such species as Silky Oak (*Grevillea robusta*), Cyprus Pine (*Callitris* spp.) and some of the important Iron Barks (*Eucalyptus* spp.) are omitted. In some cases only the common name is given of some timbers, the botanical name apparently being unavailable. In the interests of accuracy it is regrettable that botanical names are not always cited.

A section of the book deals with seasoning of timber and its conversion. The various types of kilns are described in some detail and operation methods outlined. The book should be a useful addition to the libraries of all wood technologists.

R. H. Anderson.

THE TAKE-ALL DISEASE OF CEREALS, by S. D. Garrett.

(40 *pages, 1 plate. Imperial Bureau of Soil Science Technical Communication No. 41, Harpenden, England.* 1942. *Price 2s. 6d. sterling.*)

A comprehensive review of take-all disease of cereals, presenting in proper perspective the results of the multitudinous and diverse investigations on this disease since it was first described in 1868 to the present time, has been the long-felt need of those concerned with the pathology, agronomy and genetics of cereal crops. Dr. S. D. Garrett has supplied this in his Technical Communication of the Imperial Bureau of Soil Science. He has himself been an investigator of this problem for a number of years both in Australia and in England, and as a result has been able to make many important contributions to the recent literature on the subject. This first hand knowledge of the disease, together with his extensive understanding of the literature, and his critical appreciation of the work of other investigators in this field, has enabled him to present this clear and comprehensive account of the disease.

In an easily read style the author has set out the various phases of the problem in logical sequence. The introduction deals with the early records, geographical distribution and economic importance of the disease. This is followed by a section dealing with symptoms of the disease in the field, diagnosis of the disease, isolation of *Ophiobolus graminis* and the pathological histology of infected plants. Then the physiology and morphology of *O. graminis* are discussed under the headings of the physiology of vegetative growth in pure culture, and sexual reproduction. From there the account deals with the pathogenicity of the fungus covering both host range and variation in pathogenicity. Then follows a section on field observations and experiments on the prevalence of the disease related to soil type and treatment, and climate and season. He then presents an account of the life-cycle of *O. graminis* including the subterranean spread of the fungus on host roots and on the survival of the organism. This leads to a discussion on the origin and dispersal of the disease. A section then deals with the interpretation of some pot experiments concerned mainly with microbiological antagonism, soil temperature, and soil-moisture content. Finally, control of the disease is discussed by such measures as crop rotation, checking spread of *O. graminis* on roots of growing crop, elimination of *O. graminis* from infected crop and manuring to increase plant resistance.

To aid diagnosis there is a plate of six good photographs, illustrating the symptoms in the field, appearance of the basal parts of the plant, a microscopic view of an infected root, perithecia of *O. graminis* and ascospores of the fungus.

N. H. WHITE.

Obituary

JOHN GOLLAN.

It was with great regret that his many friends learned of the death from wounds received in New Guinea of Sergeant John Gollan.

He entered the Faculty of Agriculture at Sydney University with an Exhibition and a Teachers' Training College Scholarship in 1926 and graduated in 1930 after a creditable four years course. He took a prominent part in the social and athletic activities of the Faculty, being a member of the Agricultural team which won the inter-Faculty football competition and the Shute Cup in 1926 and of the combined Agricultural and Veterinary Science team which repeated the performance in 1928.

After graduation he spent some time as a teacher of agricultural and allied subjects at Glen Innes, Albury and Hurlstone, but finally settled down in a similar position at Lismore High School. His father is a farmer in the Lismore district, and John successfully combined the intensive cultivation of part of his father's property with his school duties.

When war broke out he became very restless and eventually succeeded in breaking down all reservation barriers and joined the A.I.F. in 1941. Even while in camp he fretted somewhat at the delay but ultimately was sent to New Guinea with a tank unit, and the only news we have heard of him since then is the bald announcement that he had died of wounds. John had a very bright and cheery nature which made him popular alike with his fellow students and his pupils and he would probably have risen high in his chosen profession. Our deepest sympathy is extended to his relatives.

Personal Notes

Lieutenant A. J. Schindler of the A.M.F., a former student member of the Queensland Branch, has been awarded the Military Cross for gallantry and devotion to duty at Milne Bay.

In recent casualty lists, members of the New South Wales Branch mentioned are J. O. Smith and G. W. Clarke as missing in Malaya, and J. D. Bull as prisoner of war.

Professor Wadham has been appointed a member of the Rural Reconstruction Commission recently set up by the Federal Government to investigate problems associated with primary industries and to submit specific plans of rehabilitation having regard to markets, conditions of rural life and other rural and economic considerations.

Squadron Leader J. P. Ryland, D.F.C., has been promoted to the rank of Temporary Wing Commander.

Sergeant L. F. Mandelson has been promoted to commissioned rank in the Anti-Malarial section of the A.I.F.

Mr. A. A. Ross has resumed duty in the Queensland Department of Agriculture and Stock after spending eleven months on industrial hygiene work for the Commonwealth Government.

Mr. P. J. Skerman has resigned the position of Agriculturist at the Queensland Agricultural High School and College which he has held since 1933 and has been appointed Lecturer at Hawkesbury Agricultural College. His new duties will include the teaching of Agrostology, Bacteriology, Entomology and Plant Pathology. Agricultural Chemistry and Soil Physics will be taught by Mr. O. Craddock, who has been appointed Lecturer in these subjects at Hawkesbury College.

Mr. R. G. Downes, of the Soils Division, C.S.I.R., is at present working on some soils investigations in association with the United States Army.

Mr. R. E. P. Dwyer has been engaged for some months on investigations with rubber-producing plants in Queensland.

Mr. L. C. Holmes is now attached to the Meat Industry Commission for a period in connection with an investigation of certain aspects of pig meat acquisition.

Agricultural materials in short supply are receiving the attention of Dr. Edwards and Mr. Moodie in the New South Wales Division of Plant Industry. Mr. A. W. S. Moodie is engaged in the administration of fertiliser rationing, which principally affects superphosphate, organic manures, sulphate of ammonia and nitrate of soda. Mr. F. Filan, who was Agrostologist at Leeton Experiment Farm, is now assisting with this work. Supplies of wire, insecticides and some other agricultural materials are supervised by Dr. E. T. Edwards.

Mr. F. W. Hely has recently returned from northern areas, where he has been employed in an advisory capacity to the defence authorities concerning the fattening of live stock.

Mr. H. C. Stening, Chief Instructor of the Division of Plant Industry, New South Wales Department of Agriculture, retired in March after 31 years' service in the Department. Mr. Stening was Chief Instructor, serving also as wheat specialist, for a period of 17 years. Previously he occupied the position of Manager of Temora Experiment Farm, and earlier that of Agricultural Instructor for the southern districts when he was located at Wagga. Mr. Stening will be remembered as the pioneer of the Royal Agricultural Society Wheat-growing Competitions. He was the State Judge of these competitions, as well as the Judge of the finalists in the Fodder Competitions promoted by the same Society.

Towards the end of last year Dr. H. J. Hynes was transferred to the office of the Director-General of Man Power, where he is Assistant Director of the Rural Industries section. Mr. J. Coleman is located in this section, dealing mainly with the zoning of shearing and the seasonal register of shearers. Mr. K. Carn is Rural Officer in the N.S.W. office of the Man Power Directorate.

Dr. S. L. Macindoe has been elected President of the New South Wales Division of the Australian Association of Scientific Workers. Mr. F. Milthorpe is Secretary of the Division.

Mr. W. L. Waterhouse has resumed his lecturing and research activities at the School of Agriculture, Sydney University, after a period of absence owing to illness.

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